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AMERICAN
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VOLUME 27 SEPTEMBER 19, 1938 NUMBER 19

Waterproofing

Cotton Duck and Canvas

FELIX B. McLAIN

THE actual waterproofing and showerproofing of cotton fabrics is today essentially the same as for the past few decades. Fabrics are treated by various means with substances having a natural repellency to water which at the same time either completely close the interstices in the woven fabric or greatly reduce the size of these openings, resisting the passage of water in the latter case by the interfacial tension or repellency of the treating compound.

Actually, while the complete closure of the openings in a fabric by a water insoluble material will prevent the ready flow of water through the fabric, if this material lacks repellency water will find its way into the fabric itself and finally cause rapid deterioration.

Since this article deals only with the wax type or cheap commercial waterproof treatments, we shall not deal with the rubberized or special finishes at all.

Waxes and oils of petroleum origin are the principal water repellent materials used for such treatments although various concoctions of pitches, asphalts, wax tailings and many other resinous and water insoluble organic materials have been and are being used.

The treating of heavy ducks and canvas depends usually on the impregnation of the fabric with sufficient waterproofing compound to effectively saturate all of the yarns therein completely, or, coating the surface with a compound that covers completely, filling all of the tiny openings in the fabric.

The first mentioned, or impregnated treatment, no doubt, is for heavy fabrics the most durable and will stand a great deal more hard service than the latter or, coated type finish. On the other hand the impregnated treatments do not as a rule completely close all of the openings in the fabric and for this reason will not stand as great a hydrostatic pressure as the coated fabrics initially.

The actual hydrostatic pressure resistance of the impregnated fabrics hinges directly on two primary facts. The interfacial tension provided by the treating compound and the actual diameter and length of the little openings in the fabric. There is a definite capillarity evidenced by these little pores that appear in the proofed fabrics. This capillarity tends to lead the water through the fabric just as the interfacial tension developed by the compound tends to repel the actual entrance of the water. Hence one force partially nullifies the other and the true value of repellency is not apparent.

This condition will at first be considered a very definite drawback by most people. Actually it is an evil that eventually all commercial treatments have to combat. While initially the coated fabric, completely sealed, will stand a great deal greater hydrostatic pressure, it will after a moderate amount of use develop the same little capillary openings. The coated finish then has the further disadvantage of not having the inner fibers of the yarns protected by the repellent proofing compound. For this reason when once the openings become apparent in the coated fabric water will pass through the goods a great deal more freely than through the impregnated fabrics which are completely saturated.

It has been observed that the average purchaser of waterproof covers, flys, etc., gives little or no consideration whatever to the fact that there are numerous finishes particularly adapted to specific requirements. These finishes will each give best service when used for purposes for which they are designed and for this reason care should be taken in distributing finishes and an effort made to see that they are not misused any more than can be helped. This will prevent a great part of the complaints constantly being heard by this industry.

Nearly every waterproofer will recommend certain of his treatments as being best fitted for certain classes of work. For example, the impregnated treatments mentioned above are particularly well suited for tarpaulins, hatch covers, boat, cargo covers and uses of a similar nature. The very fact that the finish permeates the fabric through and through makes this waterproof treatment effective after wear and abrasion that would remove the protection of the coated finishes almost completely. Furthermore, the flexing and rough handling does not reduce the water repellency of this fabric by opening up the pores

more than they were originally. The impregnated finish is for these reasons most desirable for a great many industries demanding the maximum protection and wear resistance.

The coated, or surface treatments, do have a very important position in the commercial waterproof field also. The application of a continuous unbroken film of wax or waterproofing compound, filling all the pores thoroughly, makes it possible to use much cheaper and lighter weight fabrics for stationary covers, flys, construction work requiring protection for a short length of time and a multitude of other uses where the original cost is an important factor and salvage value after completion of the job is of secondary consideration.

Of necessity, a light fabric is thinner and much more open than the heavier ducks. The interstices in such light fabrics are very prominent and require a special method of application of the wax compounds to completely close the openings. The ability of a surface coating to give complete closure makes possible the use of sheetings, light drills and twills as well as the lighter ducks for a great many purposes for which they would otherwise be unsatisfactory.

While we intend to only deal with the heavy industrial waterproof finishes in this article there are a great many more special treatments available on the market that are formulated for one specific purpose. For example, the waterproof and flame proof finishes, canvas roofing and miscellaneous specialties to resist unusual conditions of alkali, acid or fungus growth.

IMPREGNATED TREATMENTS

Figs. 1 through 4 give an idea of four general principles used in providing a thoroughly impregnated waterproof finish. Each principle will be described separately giving the highlights and advantages of each.

The principle of Fig. 1 is developed with a great deal of consideration to the uniformity of finish and closure of the fabric. The goods from the original rolls or bales are first passed over a battery of drying cylinders, thence through the jacketed kettle containing the proofing compound, clearing doctors and after passing around a series of leveling and finishing rollers are looped for drying in a gentle heat or natural temperature.

The object of having the drying cylinders preceding the immersion of the goods is in order that the natural moisture content of the fabrics be driven out to the point of uniformity. Secondly the fabrics are believed to be more absorbent due to this lack of moisture. Lastly, it is evident that the preheated fabrics entering the impregnating bath do not withdraw a great deal of heat from same and make it much easier to maintain a uniform temperature. Should cold goods be entered into this bath and it was heated close to the melting point of the waxes there would be a momentary blocking of absorption by the congealing of the first waxes that contacted the cold goods. This congealed film naturally melts very quickly but the immersion time is decreased in point of effectiveness.

The kettle itself is steam jacketed and the bath is held at a temperature well above the melting point of the waxes contained in the bath. This temperature must be closely regulated and controlled since variations in temperature of the bath make a very decided difference in the ultimate results obtained. When solvents are used with the waxes it is possible to operate at much lower temperatures.

The two doctor blades set against the faces of the fabric as it leaves the kettle vertically, serve the purpose of removing the excess surface compound and permitting its return to the kettle.

The series of "finishing rollers" are simply a group of smooth 6-inch steel rollers set closely together to provide complete flexing of the faces of the fabric as it passes about them. The object being to work the slight remaining excess compound on the face of the goods into the small openings, providing more complete closure. Since the temperature of the saturated goods is falling while this operation takes place, the viscosity of the compound is increasing and it tends to remain in the openings into which the finishing rollers have worked it by both flexing and pressure.

On all types of impregnating waterproofing machines it is very important to provide sufficient stirring action, or agitation, in the kettle to keep the inert pigments and extenders uniformly distributed and suspended. This may be satisfactorily accomplished by either a centrifugal pump circulating the compound or a stirring mechanism of the paddle or screw type built into the kettle itself. The latter the writer believes to be the most satisfactory.

The treated goods after leaving the finishing rollers are looped on rods and a chain conveyor slowly passes them through an enclosed chamber where a moderate temperature is maintained, about 110°-115° F.

This moderate temperature is all important in the drying of the heavy goods finished in the foregoing manner. If the temperature is much higher the tiny wax plugs will be melted out of the interstices of the fabric and the advantages of closure provided by the finishing rollers would be lost.

The speed of operation of this type impregnator is from 40-60 yds. per minute. Depending largely on the weight of the fabric being treated and on the speed of drying. Quite naturally the drying speed itself depends, in a great measure, on the grade of naphtha or solvent used as well as the quantity of same to be evaporated.

There is one other important feature that should be mentioned at this time regarding the application of the proofing compound by this method. This is the fact that at least three immersion rollers should always be used in the impregnating kettle.

This is absolutely necessary for the uniform finishing of very heavy canvas goods. The rollers in the bath running against both faces of the goods tend to force the compound into both faces of the fabric while it is in its

FIG 1.

FIG 2.

FIG 3.

FIG 4.

greatest liquid state and enters the hard twisted yarns most readily. Further, it reduces the tendency of heavy goods to finish with a distinct shading from face to back. This shading from side to side is sometimes due to the fact that when some of the heavier ducks are woven they are beaten up with a decided face side that is not as receptive to absorption of the treatment as the back.

Fig. 2 shows a second principle of impregnating. This method does not recognize the necessity of preheating the goods nor the fact that a series of immersion rollers are required to give good results.

The grey fabric is pulled directly from the rolls or bales through tension bars and into a shallow steam jacketed pan containing the compound. After only a short immersion the goods are drawn from the bath horizontally through two doctor blades that remove the excess compound.

With this method of impregnating the goods travel from the impregnating pan directly over hot drying cylinders. The heat of these cylinders removes the slight amount of naphtha, if such is used, and by means of the high temperature drives the molten compound back and forth through the goods. In fact, it might be said, the hot cylinders boil the waxes into the goods.

It is to be noted that the moisture content of the fabric will be removed also by this hot cylinder drying giving unquestionable saturation.

Leaving the hot cylinders the goods travel through several loops until they have lost sufficient heat through air cooling to be wound into rolls as finished fabric.

Some of the lowest priced finishes on the market are produced in either this manner or variations of same. The goods traveling at a speed of approximately 40 yards per minute and having little or no solvent to dry out of the finished fabric excellent penetration is obtained at a very low cost.

Little or no penetration takes place in the bath by this method of application. This fact coupled with the fact that the goods do not carry an excess of material to the hot cylinders makes closure of the openings in the goods very poor. In fact some of the goods are afterwards rewound on a calender winder to obtain a better closure of the openings. This latter is not the complete answer to the problem however since the goods do not, even when lightly calendered, show a good sealing of the openings.

Fig. 3 will be immediately recognized as the padder method of application with which nearly everyone is familiar. This method is one of long standing and of undeniable merit for the application of numerous finishes uniformly, especially to light weight canvas, although heavy ducks are often treated by this method also.

There are a number of results that cannot be produced on padding equipment. The limitations of this method are recognized particularly in the field of heavy waterproof finishes. Best results are obtained on the showerproof and repellent treatments.

Firstly, the padding of heavy waterproof finishes is accompanied by an almost total lack of closure of the interstices of the fabric that might normally be expected by this treatment. Without especially formulated compounds providing a tenacious viscous film there will be practically no closure at all. Again when waxes alone are attempted on the padder unless special precautions are taken for preheating the rollers the results will be very streaked and blotched by the chilled film from the rollers themselves. Sometimes these rollers are preheated by running the padder for a short time before the goods are threaded up. When this is done the hot waxes in the jacketed pad box provide the necessary heat.

In the past the composition of these padder rollers has been a problem of no small moment. Padders for applying wax and wax solvent blends were of necessity equipped with wooden bowls lapped with fabric to provide enough resiliency to permit closure at the selvages of the fabric being finished. In the last few years advantage has been taken of the oil resistant rubber rollers and still more recently the new synthetic rubber compounds. These have proven a boon to the finishers using padders since the old cloth lapped rollers quite often developed "mark-off" defacing of the finish which was caused by the end of the cloth lapping.

The density of rubber rollers for padding canvas is a matter of a good deal of controversy. The writer has determined the following recommendations to be satisfactory for the purpose: For the finishing of medium weight army ducks, drills and twills with a fairly heavy nip a plastometer density of 12-18 is indicated for the bottom roller. The top roller should be somewhat softer and here plastometer density of 26-34 is suggested. These are fairly hard rolls compared to those used for some other work but some softening will take place even with the most resistant materials obtainable and the use of a roller too soft will be disadvantageous in the application of waxes. The fact that a really soft nip does good work for other purposes is not true in proofing. It is desirable at all times to leave as much wax in the little pores of the goods as possible and this cannot be accomplished with a roller so soft that it lifts out the slight amount of wax deposited in these pores.

Padded goods are as a general rule dried in a loop dryer. Contact drying may be used on many of these finishes however if desired when the little closure that exists is a matter of no importance. The writer has noted that fabrics padded and dried in the two different manners mentioned show entirely different hydrostatic resistance. The loop dried goods standing a great deal more pressure than those dried over hot cylinders.

The padder really serves to best advantage on repellent type finishes where a surface excess is to be avoided. These repellent finishes require only a very small percentage of waxes and oils to provide the ability to shed water. Such finishes are used for tentage, clothing, etc. In fact a great many of these repellent treatments are being applied from water emulsions by means of the

padder and very excellent results are being obtained by a number of finishers.

Figure 4 represents one of the best principles for the complete and uniform saturation of very heavy fabrics. This method also works well on light weight goods where high speed production is desired and drying facilities are designed to care for the volume produced.

The fabric goes directly into the steam jacketed impregnating kettle where it passes through a submerged nip. A second nip is situated above to give a second squeeze as the fabric leaves the bath vertically. The latter nip reemoves all the excess compound and allows it to return to the kettle.

This method of impregnation is designed to provide quick maximum saturation of the fabric and have it leave the bath without any great excess of compound. The heavy nips make it unnecessary to use a great amount of naphtha to get good results. The reduction in naphtha, or solvent, reflects a double saving; first in the cost of naphtha and second in the amount of time required to completely dry the goods. The submerged nip greatly accelerates the impregnation due to its action in squeezing out all the trapped air and allowing the take up of compound as rapidly as possible.

Finishes produced by this method have a particularly clean face, free of all excess compound and yet show a very complete saturation of all yarns in the fabric. This means a great deal in long life and continued waterproofness.

To dry heavy goods at the highest possible speed and with the least amount of space practical a two compartment chamber is used. The first compartment is heated to a comparatively high temperature to "flash dry" the greater part of the volatile content. 300-320° F. may be used in the first chamber without damage to the fabric provided the goods do not remain in the high temperature too long.

The principle of this type of drying may be defeated if too great an amount of drying is attempted in this first chamber. The high temperature does not injure the goods as long as they contain an appreciable amount of solvent, or naphtha, which in evaporating prevents the fabric itself ever reaching the temperature of the chamber. However should all the naphtha be dissipated before the goods have traveled the full length of this first stage then the baking of the goods starts and loss of strength occurs.

The second stage should remove the last 10-20 per cent of the naphtha from the fabric at a temperature of about of about 130° F. It will be found that the input of heat for this second box will be very small and on very heavy goods all that may be required is just enough air circulation to permit evaporation of the last of the naphtha.

We wish to call attention to the fact that the above described diagrams of methods for the application of the impregnated finishes are not scale drawings but rather of a schematic nature for the purpose of illustrating the principles rather than providing a solution of any definite mechanical problems.

The actual mechanics of any installation for waterproofing require a great deal of study and consideration if truly controlled results are to be expected. The old lackadasical methods of cooking up a batch of compound in any old kettle and applying it to fabrics could never give results of uniformity on the vast yardages of matched finishes required today. The above described methods with ordinary care will provide consistently good application of the compound itself which if uniform will insure acceptable results.

Before we give a few formulas used for the production of saturated, or impregnated, finishes permit us to say that these formulas are not to be taken literally and exactly as being adaptable to any type machine and operating condition. Certain variations are always to be expected for each individual problem. Speed, temperature, time of immersion, pressure etc., all have a great deal to do with the application of all these treatments and variations are usually necessary to meet the immediate problem. These formulas are however representative of blends of materials that will give good waterproof results and are suitable for the impregnated type of finish.

The usual waterproofing compound is composed principally of waxes, plasticizers, pigments and extenders. The pigment and extender, or filler, as a rule comprises about one-third of the compound. This proportion is varied in many instances but will be found to be a fair average for the heavier types.

The duty of the waxes is to provide the necessary interfacial tension or repellency, act as a binder of the pigments to the fabric and as a sealing agent of the openings in the fabric. Many characteristics may be obtained by the skilful blending of the many available waxes and bitumens. By this we mean, for example, to obtain a stiff finish a hard 165° m.p. amorphous wax would probably be blended with a 135° parafine. An adhesive and flexible compound would likely contain petroleum asphalt, petrolatum and crude scale wax.

Asphalts find a great deal of use in waterproof finishes due to their low cost and the idea that they have a preservative nature. The latter is not alway true and for this reason the user of asphalts should be exceedingly careful in the quality of this material. There are many asphalts that will quickly rot cotton fabrics, sometimes by residual acid content, again by an element contained in this product that promotes the burning of the cellulose to such as extent that the strength is greatly impaired.

For most general purposes an asphalt with a melting point of approximately 190° F. is recommended. It is true that the lower melting point asphalts are usually cheaper but the heat of a summer sun will affect the finishes made with these to such an extent that covers made from same will spoil most anything with which they come in contact.

A compound that is suggesteed for impregnation of tarpaulin fabrics is as follows:

25 lbs. Neutral petroleum asphalt.
20 lbs. 124-126° F. m. p. Paraffine.
25 lbs. 135-140° F. m. p. Petrolatum (Amorphous wax)
35 lbs. Venetian red.

105 lbs. Total

The above compound is thinned from 50-100 per cent for the impregnation of canvas. The wide variation in the percentage of solvent named is due to the wide variation in the qualities of finishes required as well as the many varieties of canvas that are treated. Some instances may require as low as 15 per cent solvent naphtha where a heavy fill is desired. All percentages are based on the weight of the compound as a basis.

Naturally when finishing very heavy ducks without the benefit of squeeze rollers the solvent proportion runs higher. When the impregnating machine is equipped with a set of squeeze rollers smaller quantities of solvent are used. Just how low depends on the expression of the nip and the final degree of fill desired and must be determined definitely for individual equipment.

Regarding the percentage of fill, based on the original weight of the fabric treated, it has been the writers experience and observation that the following are in general the best average loadings. Heavy ducks: No. 8 and heavier, from 30 to 40 per cent, preferably below 40 per cent. Number 10 duck weighing 14.73 oz. sq. yd. and drills, twills, etc., lighter than 18 oz. sq. yd. should be filled to the extent of 40-45 per cent due to the more open nature of the goods. Single and double filled ducks also as a general rule fall into the latter class except when they become too light for the impregnated finish and should be coated.

It is quite true that much smaller percentage of waxes would provide excellent repellency but sight must not be lost of the fact that the inerts and pigments used in the compound are utilizing part of this repellent value and must always be considered when determining the percentage of waterproofing required to give good protection and closure.

It is a well known fact that in the past there have been a great many of the mud type finishes on the market. These usually appear when the finisher for one reason or another has to cheapen the cost of his treatment and has done so by overloading the compound with inert extenders. In such cases it is not unusual to find that the extender runs as high as 60 per cent of the compound used for the treatment. It is not to be denied that better filling of the pores of the fabric is accomplished by this excessive extender. On the other hand by the time the waxes provide repellency to this over-burden of inerts there is little left to protect the fabric. And in case the treatment is exposed to the hot sun the fabric will absorb the waxes leaving the pigments and extenders practically no binder to hold them on the goods.

From the foregoing it is readily seen that there can be little durability expected from fabrics treated with unbalanced combinations. The overloaded finishes usually smudge very badly and rub off after only a moderate amount of use and the wearing qualities are so impaired that even after short exposure the goods are often almost worthless as far as actual protection against water is concerned.

Heavy goods of close weave and tight construction really require little if any inerts. If color is of no great importance the following is a good example of a pure finish that is to be recommended for such heavy fabrics:

15 lbs. fuzed lead oleate.
30 lbs. Petrolatum 110° F. m. p.
50 lbs. Petroleum Asphalt 190° F. m. p.
5 lbs. 133° F. m. p. Paraffine wax.

100 lbs. total

Another formula of excellent characteristics employs Gilsonite rather than the Asphalt and produces a dryer finish that is very durable protecting the strength of the fabric quite well.

15 lbs. fuzed Lead Oleate.
75 lbs. Petrolatum, 140° F. m. p.
10 lbs. Gilsonite.

100 lbs. total

Both of these two latter formulas will give a pleasing brown color. The formula containing the asphalt will naturally be considerably darker than the latter which produced a pleasing light nut brown.

These two formulas are designed to produce maximum repellency, a good resistance to mildew and flexibility at all natural temperatures without becoming smudgy by heat or too stiff from cold. Small amounts of color may be added to tone these finishes up if desired; however if flexibility is of great importance this must be done in strict moderation since any great addition of inerts will cause a decided stiffening of the finish in cold weather.

The preparation of the above compound should be carried out over a gas fired or an electric kettle. Ordinary steam heat makes it a very slow matter to incorporate the Gilsonite and lead oleate in the melt. It is recommended that the petrolatum be heated to about 400° F. The Gilsonite is then stirred in until completely dissolved and the lead oleate is entered last with constant stirring. The melt is then run through a strainer to remove any impurities the Gilsonite or oleate may have contained. The compound may then be stored for use later when it is cut with the proper amount of naphtha and applied to the goods.

We have mentioned the solvent naphtha a number of times and we think it would be wise to state just what we have reference to at this point.

Stoddard Solvent or similar cuts have been used quite extensively for the application of waterproofing compounds but has not been found to be as satisfactory as some of the

special cuts by those who have used both. This special cut which seems best adapted to this class of work should have an initial boiling point of about 265-270° F. and an end point of approximately 365° F. There should be less than ½ per cent residue, odor sweet and with a high solvency ratio. 90 per cent should distill over in a spread of 40° F. This close cut will be found to give excellent drying characteristics and has the added value of better solvency ratio. The flash of this solvent should be as high as possible but it is usually difficult to obtain such a close cut with a flash higher than 85-90° F.

Returning again to the last two formulas. There is often a tendency for the bath to foam considerably when formulated with oleates. This as a general rule may be greatly reduced if not completely eliminated by simply raising the temperature of the bath. This foaming will usually cause streaking and mottling of the fabric being treated and must be controlled. The best insurance is to maintain the bath above 120° F.

The writer has known of formulas that had such a tendency to foam that the entering goods had to be introduced to the bath between two metal shields which prevented the foam from geting to the face of the goods. When such shields are used great care must be taken to see that they are completely grounded to carry off any accumulation of static electricity.

There have been numerous formulas passed to the trade in the last few years recommending the incorporation of one thing or another to produce different types of desirable qualities of waterproofness, dryness, mildew resistance, etc. Many of these actually are no better than compounds made of petrolatum and paraffines skilfully blended with an understanding of the resulting qualities they will give. Some offer some slight improvements by use of additional gums and metallic soaps. There is one group we feel deserves specific mentioning.

We refer to the finishes that have been produced for the specific purpose of providing a high repellency and at the same time a very dry, non-tacky, greaseless type to be used in contact with valuable merchandise and for special jobs requiring these characteristics.

In formulating this type of finish use is made of the hardening values of stearates, usually aluminum, magnesium, calcium or some of the other common metals that will cause a toughening of the oils and waxes to such an extent that the tendency to soften in heat is greatly reduced. At the same time the flexibility in cold weather is not sacrificed. The following is a concrete example of one of these treating formulas of the most costly type:

22 lbs. 148° m. p. Hard amorphous wax.
70 lbs. 130° m. p. Petrolatum
8 lbs. magnesium stearate (or Aluminum)

100 lbs. total.

When using the above formula ample solvent must be used and a final weighting of the goods should not represent more than a 20 per cent increase over the original weight of the untreated fabric. This is ample to produce the high repellency desired and since there is no inert content to this finish it will have excellent durability even with this small filling.

The above formula may be used to showerproof goods also by running a fill of only from 7 to 10 per cent on the goods. This will give a high repellency and lasts exceedingly well.

Further this formula may be rebalanced and used to produce a colored finish of the heavier loading variety. We give you a rebalancing for a white treatment.

20 lbs. Asbestine.
10 lbs. Lithopone.
20 lbs. 135° m. p. Paraffine.
72 lbs. 140° m. p. Petrolatum.
8 lbs. Aluminum Stearate.

130 lbs. total

With this formula which is designed to fill the more open constructions from 35 to 45 per cent fill should be used based on the original weight of the fabric. The closeness of the fabric will have to be the determining factor for the degree of fill in the final analysis.

While the greatest demands for waterproof goods run into four colors, Tan, Olive Drab, Green and Brown there are however certain industrial users of goods who require special colors. These special demands at times force the waterproofer to create special colors and finishes. When this is necessary it is indeed well to be thoroughly acquainted with the available suitable pigments and the best methods to use to obtain workable blends. Getting the full color value from pigments is very often overlooked.

The tan colors are produced principally from yellow ochres, both from this country and from France and South Africa, and precipitated iron oxides. The chrome yellows are to be avoided in waterproofing for the cheap trade. These latter do not possess the stability under all conditions afforded by the iron pigments.

Green finishes are for the most part produced by the use of Chrome Greens, as they are commercially known, the actual composition being prussian blue and lead chromate. A great many proofers today are using a by-product green of this type that is inferior in purity and not dependable in color value. This is a pigment that is removed from the sludges of the settling pools of the color manufacturers and standardized to a certain shade being then sold rather cheap.

The practice of using this type of pigment we would not encourage for several very obvious reasons. First the color often contains barytes and other abrasive impurities, secondly there is no assurance that the fastness qualities are comparable from lot to lot again it is a matter for debate whether there is any real economy in the purchase of the low-strength color, particularly if the proofer is equipped to grind his pigments.

Olive Drabs are produced by the blending of the tan

and green with an addition of either burnt umber or asphalt. The latter is the most general element used.

Browns are either of the asphaltic base type toned with red oxides of iron or a straight pigment brown made with burnt umber and red oxide. The Asphaltic browns are by far the most popular with nearly all proofers.

For the incorporation of pigments and colors in the waterproofing compound in the most effective manner possible it is well to take a point from the paint manufacturers. If particular attention is paid to the coloring of paints it will be noted that the color dispersion is indeed excellent. These pigments have all been well ground in oil mediums to obtain the greatest color value possible from the pigments. The particle size is materially reduced by the grinding operation and the suspension qualities are greatly improved.

For these same reasons it will be found to be a real economy to use good colors in waterproofing compounds, grinding them well to obtain the best possible dispersion and color value from them. Suspension qualities are particularly important in the waterproofing compounds since and waxes and oils used for this purpose do not have the ability to support the pigments afforded by linseed, china wood oil and the varnish mediums of paints. There is no question that the suspension of pigments and extenders are greatly improved by a grinding before incorporating in the compound.

The simple stirring into the molten waxes of the pigments and inerts we know in the past has been quite common practice but more and more of the proofers are installing special grinding and mixing equipment in order to improve their control of finish and color.

All pigments and inerts should be as free of grit and abrasives as possible. Abrasiveness of pigments not only causes a great deal of wear on doctor blades, rollers, etc., when treating goods but provides a great source of trouble to those who have to cut and sew the heavy materials into covers and usable articles. When sewing goods containing abrasives we have seen needles heat to a red heat and snap off. For this reason all silica and very gritty fillers and pigments should be avoided as much as possible.

SURFACE COATED FINISHES

It has already been mentioned that in order to provide good water resistance on light weight fabrics that the simple peneration, or saturation of the goods with a repellent compound does not prove satisfactory. Such fabrics must be treated in such a manner that the small pores will be as completely closed as possible. To accomplish this result there are a number of methods in use that aim at the same final result.

Coating machines possess some uses which impregating equipment cannot serve. One of these is the production of two-tone or duplex finishes. In other words a coating machine that coats each face individually may apply one color to the face of the goods and a second to the back to produce finishes known as "two-tone" and "duplex."

Figures 5 to 8 show four different methods of coating the two faces of the goods independently, in such a manner that the little pores in the fabrics are practically completely closed at the same time. We want to say now and will discuss in more detail later, that the temperature of the proofing compound and the weight of the fabric has a most important bearing on the success and control of uniformity of these coated finishes.

Figure 5 illustrates one of the simplest forms of coating machine in use. This same principle has been in use many years in almost this identical manner and still gives good results if proper care is taken in operation.

In operation, the grey fabric is drawn through a set of tension bars and underneath the doctor blade. The pulling of the fabric is done by a single roller at the back of the machine covered wits card clothing. The coating compound is fed in a pool directly in front of the doctor and is scraped directly onto the face of the fabric passing under same. Please note that a doctor of considerable thickness is recommended for this type of coater when light weight or open goods are to be finished. This is to allow the beveling of the edge of the doctor on the side from which the compound is applied. Note enlarged detail.

This bevel will be found to play an important part in forcing the compound into the openings of the fabric to provide the best possible closure of same. When there is a tendency for the fabric to take up too much of the compound this may be regulated by the simple expedient of rotating the eccentric at the rear of the doctor to cause heavier scrapping action and by increasing the tension of the incoming fabrics or both.

Figure 6 is a brush coater that has in the past been very popular with many finishers. This brushing into the fabric of the compounds does provide a characteristic appearance and quality of the finish that cannot be duplicated by other means. The brush rotates in a steam jacketed kettle, which is closely regulated to provide a uniform temperature just high enough to keep the waxes in a liquid workable state so they may be evenly brushed and distributed on the face of the goods. Pressure against the rotating brush is best regulated with a bar mounted on an eccentric as shown.

A doctor blade is used to remove the excess compound from the face of the goods and return this excess to the kettle. The power, or pull, of the fabric is provided by a card clothed roller from which the goods pass to a hot flue for drying.

Although this machine is shown with coaters for light weight fabrics it can also be used for the application of paint and solvent type treatments to produce duplex finishes on heavier goods. In fact the very versatility of this equipment is one of its strong points. The chief objections being to the difficulty of cleaning the brush when changing from color to color or the high cost of having a number of brushes for different colors.

Figure 7 shows a font coater. This equipment is used

Fig 5. Single Side Knife Coater

Fig 6. Single Side Brush Finisher

Fig 7. Single Side Brush Tinter

Fig 8. Two Side Coater

for painted tints and solid colors. The goods pass first over a starching roller which applies a thin film of starch to the face of the fabric. This wet starch on the face of the goods is used to prevent the penetration of color from one face to the other when light weight goods are used. This is absolutely necessary with paint materials since the oil medium bleeds through a light fabric very quickly.

In operation the liquid compound is placed in the font which rests directly on the moving sheet of fabric. Underneath the font is a sponge rubber pad to care for irregularities in the fabric and provide an even resilient pressure to prevent the liquid from bleeding out from under the font. There is a slot milled into the bottom of the font extending completely across so that the full width of the fabric receives the compound uniformly. Two flat oscillating brushes are used immediately following the font to work the compound evenly into the fabric eliminating streakiness and slight blobs of color.

Figure 8 shows a coating device which eliminates the expense of running the goods twice to finish with the coated treatment. There have been a number of these machines used with various innovations, both in this country and abroad. This illustrates the principle generally used with the greatest success.

The coating of the two seperate sides is accomplished in this case by smooth steel rollers rotating opposite to the direction of the fabric travel and applying the waterproofing compound from a jacketed kettle in which the lower half of the roller runs. In this case the pressure of the goods against the face of the roller is controlled by an eccentric "E" and the pressure against the clearing doctors is regulated by an adjustable bar against the face of the goods just preceding the doctor itself.

The cooling rollers shown in this sketch have a very definite function and without this arrangement it is found most difficult to control the coating of the two faces in a uniform manner. This is directly due to the fact that the goods contacting the first coating roller are at room temperature and the compound is at a temperature of approximately 120° F., just for the sake of an example. Naturally the temperature of the fabric is raised to an intermediate point after receiving this first coating, leaving the roller, for example at 100-105° F. This intermediate temperature is below the melting point of the waterproofing compound and permits the congealing of same in the pores of the fabric.

The goods approaching the second coater at a higher temperature naturally leave this coater at a still higher temperature unless some of the heat is removed between the coatings. The additional heat picked up at the second coating would make the compound sticky or prevent the proper congealing in the openings of the fabric. Hence the cooling cylinders serve the purpose of reducing the temperature of the fabric between the coaters to the point that the second application will be made at as nearly as possible the same temperature as the goods were originally before the first coat. With proper care the cooling rollers will enable the coating of both faces of the goods in an identical manner. Care should be taken however that the goods are threaded over the cooling cans in such a manner that the coated face does not come in contact with them. This might permit compound to build up on the cool surfaces and cause marking of the finished face of the goods.

To definitely classify goods which should be treated with the foregoing coated finishes the following is recommended: All numbered ducks lighter than No. 10 which weighs 14.73 oz. per sq. yd. All double and single filled ducks lighter than 14.90 oz. per sq. yd. All army ducks lighter than 37" 13 oz. lin. yd. All drills and twills lighter than 10 oz. per sq. yd. and all similar light weight materials unless of special construction or sealing of the pores of the fabric is not desired.

Weights heavier than those mentioned above have been found to give best results when finished with the impregnated treatment.

In the formulation of the coating compounds drying is almost completely neglected for some treatments. Since there is no naphtha or other volatile element contained in these formulations the drying of the fabric depends largely on the congealing of the waxes and the lowering of their temperatures to such an extent that there will be no sticking of the faces when pressed together. Typical formulas of this type of finish are as follows:

Brown

40 lbs. Amorphous wax 145 to 165° F. m. p.
50 lbs. 133° F. m. p. Paraffine.
20 lbs. Gilsonite Selects.
15 lbs. Petroleum 140° F. m. p.
5 lbs. Pure Red Oxide of Iron.
55 lbs. Extender, Repeller clay or Asbestine.

185 lbs. total.

Tan

45 lbs. Amorphous wax.
45 lbs. Paraffine.
30 lbs. Yellow Ochre.
30 lbs. Extender.
18 lbs. Petrolatum.

168 lbs. total.

Olive

25 lbs. Amorphous wax.
25 lbs. Paraffine.
16 lbs. Petrolatum.
2 lbs. Asphalt. 190° F. m. p.
10 lbs. Yellow Ochre.
2 lbs. Chrome Green.
20 lbs. Extender.

100 lbs. total.

This last formula for olive is subject of the widest variations of any of the colors used for proofing. These variations may be cared for simply. To make a green simply double the Chrome green. Yellow Olive shades will re-

quire the reduction slightly of the green and doubling of the ochre, possibly even more. In fact all finishes are subject to easy variation when two or more pigments are used in combination. Great care must be used in these cases however to maintain exact weighing of color if uniformity is to be maintained.

MIXING FLOOR

Control of color and uniformity of finish is often dependent to a great extent on the organization and handling of materials in the mixing room. For this reason it is of the utmost importance that certain definite routines be established for the weighing, blending, mixing and temperature control at this point. Standard batches should be adopted for all active finishes and a number of these batches blended whenever practical to insure compensation of errors to as great an extent as possible.

Some plants simply melt the waxes and dump in the pigments and inerts, stirring briefly and then proceed to apply them to the goods. Others have special mixing and blending equipment. When the pigments are worked in the heavy duty mixers just enough of the molten waxes are used to make a heavy dough. These mixers are very much like the heavy duty horizontal bakery mixers and do knead the pigment and extenders into the waxes well. These mixers do not however provide any grinding action and cannot greatly increase the color value of concentrated pigments.

Concentrates are made as above, cast into blocks and stored until needed when they are weighed out and the wax they contain is deducted from the formula. This routine does insure good color control and uniformity from mix to mix if ordinary care is used.

Still another method mentioned previously and to which we are partial is that of grinding the colors in iron mills or on three roller mills to reduce the particle size and increase the color value. This grinding requires the use of a more liquid medium than the waxes and many combinations are used a few being as follows: petrolatum thinned with naphtha heavy mineral oil, heavily bodied linseed oil thinned with naphtha, Oleates and petrolatum thinned with naphtha etc. Each individual seems to have worked out a medium satisfactory to his purpose. These mediums as a general rule are composed of ingredients contained in the waterproofing compound and are simply compensated for when making a mix.

This method of grinding provides a pigment and extender base that disperses well and quickly, without melting, the suspension is greatly improved because of the smaller size of the particles of pigment and extender and greater color value is obtained from nearly all pigments. In fact C. P. colors may often be used economically by grinding with the extenders when this method is pursued. This saving in color in a great measure defrays the cost of grinding, particularly when the strong high priced colors are used.

The actual grinding is usually accomplished on the small iron mills. Nearly all sizes are in use but the best from a grinding and production point of view seems to be the 24" mill.

Some finishers having large melting plants, melt and blend their waxes in large quantities, cast them into blocks and store for future use. These standard blocks of blended waxes are then melted when needed and the standard color blocks are added for the color desired. This system requires much less stock than if each color is cast into blocks complete and stocks are retained of all colors.

There are many ways in which economies may be effected in the mixing and blending of the waxes and compounds and these methods are, we think, deserving of more attention than is usually accorded them.

In concluding this article the writer wishes to state that he is well aware that there are many other types of waterproofing machines and formulas both in this country and abroad but by far the greater part of the heavy treatments in this country are applied along the principles he has outlined.

Dyeing

Cotton Raw Stock

ANDREW FISHER

THE problem of raw stock dyeing may be analyzed as follows:—

There are five factors in every lot dyed.

1. Cotton.
2. Machines.
3. Dyestuffs and chemicals.
4. Labor.
5. Condition of the water available.

It is one of the easiest kinds of dyeing provided the volume of work is large enough to permit large batches being dyed at one time and thoroughly mixed before using. If the dyestuffs run uniform and the materials are properly weighed and dissolved, uniform results follow as a matter of course.

First, the cotton may vary in color all the way from almost white to nearly brown. This usually does not show much effect on dark shades but light shades have to be bleached. First of all the bulk of dirt can be washed out by using plenty of water which must be clean.

Second, the machines may be old or new, they may use a large volume of dyebath in proportion to the stock or a small volume. Sometimes continuous machines can be used for very large plants but there are very few such machines in use.

Third, the type of dyestuff to be used makes a difference but the general principles of all are the same viz. perfect solution and plenty of movement of the liquor through the cotton or the cotton through the liquor so that small amounts of dyestuff are deposited uniformly.

Fourth, labor is a simple problem provided the turnover is zero but very tough when the turnover is large. Experience in handling the cotton is absolutely essential and sometimes it is a matter of years of experience being an absolute necessity or at any rate very helpful.

Fifth, the condition of the water is important. Hard water is a nuisance and should be softened. Cloudy water should of course be filtered. Impurities of any sort may be troublesome, but the time to find out about the water is before the dyeing and not after. Here is where the laboratory is indispensable to uniform results.

AN ACTUAL EXPERIENCE

For the purpose of this paper we might make our points clear by simply taking one actual experience in a large dyehouse and describing some of the problems which bothered us and giving a detailed explanation of steps taken to overcome our difficulties.

We were dyeing two hundred thousand pounds a week of robin egg blue which required twenty pounds of Indanthrene Blue GCD paste for twelve hundred pounds of cotton. The machine was the well known type of Chattanooga machine and the water was of the best, except in the spring of the year it contained sand and a little more carbonic acid than usual. The holes in the cover were very small and the first thing we did was to make them larger and larger until we had them up to about 1½ inches in diameter. This brought down the pressure so that we had no danger of the cover blowing up. The cotton was packed wet and usually we started the washing operation and then stopped, added more cotton and started again. The cotton was first of all put through a rough picking and carding and the top strip from this carding operation was used for coarse yarn in bags or cheap flannel for workmen's gloves napped on one side.

In deciding how much chlorine to use, experience was a very necessary factor, but eight pounds of chlorine would usually do the trick provided the cotton was well washed previously. This was accomplished by what we called the running wash, i.e., pumping water through the cotton and letting it run out over the top of the machine. Of course we had the Merrimac River behind us and the water cost practically nothing. It was a great surprise to me the first time I saw the amount of dirt which was removed by this simple operation. Next we placed a cylinder of chlorine on the scales and put a rubber tube into the pipe leading to the pump. There was evidently a large enough quantity of carbon dioxide in the water to complete the bleaching reaction because we always got good results. We made a great many tests to determine exactly how much chlorine was needed and found them mostly unnecessary. A slight whiff of chlorine on the top of the machine was the best kind of an indication that the reaction was complete.

The valves were now changed so as to circulate the chlorine water through the cotton for about fifteen minutes, no more chlorine gas being added. This was followed by about fifteen minutes of a running wash, then a couple of buckets of bisulfite of soda solution added and circulated through the cotton and the operation was finished. In cold weather we sometimes had trouble blowing the dried cotton around the yard but this difficulty was overcome by letting the cotton get good and cold before we started it through the pipes.

If the cotton was to be dyed of course we did not take it out of the Chattanooga machine until the dyeing operation was finished. This was accomplished by mixing the dyestuff with a little warm water, hydrosulfite and caustic and getting a perfect solution. With the machine in circulation we always put a little hydrosulfite and caustic through, got the temperature uniform all over the top (about 120° F.) then put the dyestuff in the top, let it run down into the pump, and circulated it through the cotton for about half an hour. When completely exhausted the valves were changed and a running wash for about fifteen minutes finished the job.

We had a gang of about ten men and they could average about five machines. These ten man gangs loaded the machines and emptied them into boxes which were dumped into centrifugal machines which emptied into blowers and the cotton was blown upstairs to dryers. In this way the batches were thoroughly mixed and we never had a bit of trouble with this particular shade. In the picker room we sprayed the cotton with Glauber's salt and soda ash solution and the carding and spinning ran like unbleached cotton, year in and year out. The whole operation added about one-quarter cent per pound to the cost of grey cotton and our job was a cinch.

In this particular case we had all five factors under control and especially the labor factor. In the four years I was at Amoskeag no labor troubles occurred in the cotton raw stock dye house. The Indanthrene Blue GCD was absolutely perfect and the chemical department took good care that all chemicals were of uniform quality. The volume of water in the machine was approximately seven hundred gallons which the pump handled in about two minutes.

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American Association of Textile Chemists and Colorists

SEPTEMBER 19, 1938

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Report of the Nominating Committee

FOR election in the fall of 1938 the Nominating Committee presents the following candidates:—

President—Alban Eavenson.

Vice Presidents—Duncan Ferguson and Arthur R. Thompson, Jr.

Treasurer—William R. Moorhouse.

Councilors at Large—Peter J. Ariente and R. S. Wheeler.

In accordance with the Constitution, counter nominations for any office, signed by at least ten Active members, may be filed with the Secretary of the Association not later than November first, and if so filed, will be printed on the ballot.

Signed,

A. F. Beane, South Central Sec.
A. T. Brainerd, Mid-West Sec.
Elliot Broadbent, Rhode Island Sec.
Ephraim Freedman, New York Sec.
A. H. Gaede, Piedmont Sec.
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C. A. Seibert, Philadelphia Sec.
W. H. Zillessen, No. New Eng. Sec.

The Dyeing of Iridescent Hosiery*

HENRY DIXON**

"DAME Fashion has decreed Iridescent shades for ladies full fashioned hosiery and Miss America has accepted them, and the demand is consistently getting larger."

Iridescence is that quality in an object which possesses the power of exhibiting shimmering rainbow colors. Also, that quality in a material that causes the appearance of having many colors. It appears in nature in the plumage of some birds like the peacock, in skins of fish, soap bubbles, on the surface of water where oil is floating, and very markedly in many dyestuffs.

Recently the writer has asked several of the "older boys" concerning the beginning of iridescent dyeing on hosiery. From the best information obtained it seems that as late as 1920 there was quite a limited amount of iridescent dyed hosiery offered to the public. There was so little interest manifested in these colors that this type of hosiery dyeing was practically dropped until about two years ago. It was approximately 1936 that high colors came into vogue again, and a few manufacturers included in their line of hosiery a few iridescent shades.

Only a year ago the number of mills in this section dyeing iridescent hosiery could easily be counted on one hand. Today, most mills, whether seamless or full fashioned, dye a large portion of their production in iridescent shades. This gives one some idea of its growing popularity. Some periodicals claim this type of dyeing has revolutionized the hosiery industry; thus keeping that branch of textile manufacturing running at full production.

There were very few of us at our meeting here last spring who knew how an iridescent stocking looked; nor were we greatly concerned because we knew that when laundered these colors would crock and have greenish streaks when dry, and if exposed to sunlight would fade before one's very eyes.

However, at this stage of the game, it was the consensus of opinion that iridescent shades in hosiery would be short-lived. We argued that our fair sex would never take to colors which matched their costumes in stores under artificial light, and when brought to daylight would turn to strawberry pink. To our very great surprise and pleasure, the reverse of our fears is true, and practically all of our lady friends not only wear, but enjoy these iridescent shades; and those manufacturers who did not include these shades in their line of merchandise have failed to get their share of orders. We may attribute this growing popularity to the fact that more recently greater emphasis is placed on color blending; thereby producing a more harmonious and flattering effect.

Many of us, and I venture to say, all of us feared this new monster, and we hoped with all our being that it would not approach our places of work; but Iridescents came right on in, and out of the window went our fears.

Except for the two mentioned facts of light and wash-fastness, there was nothing to worry about different from regular shades. The two above mentioned shortcomings we leave to the hands of our expert friends, the dyestuff manufacturers. We are sure, as in the past, that they will come through with all the brilliancy, iridescency, and fastness that will bear any inspection.

There are many opinions, as in all other hosiery dyeing, for dyeing iridescent shades. A few days ago the writer inspected a stocking dyed in a one bath operation, using olive soap as the degumming medium. This particular dyer used degumming oils entirely and removed practically all the gum in the first bath. The dyeing was accomplished in an almost neutral bath. This dyer explained that he could obtain more brilliance and iridescence by using soap to retard the colors. Perhaps others here have experienced same.

Other dyers, after degumming, dye in as lightly alkaline bath, and add the colors in parts, making from two to three additions of certain colors. This method, they claim, obtains more pronounced iridescence. They also claim that colors dyed by this procedure cannot be matched exactly by adding all the colors at one pouring. No doubt there are those present who have tried this method.

When only a few mills were dyeing iridescent shades, very little attention was paid to the cotton. As a matter of fact, most of the hosiery was knit entirely of pure silk. As production and demand for iridescent shades increased, some of the mills which did not have a style of all pure thread silk in their line, discovered to their sorrow that a poor looking stocking was the result when they used their regular cotton colors along with the iridescent colors. The foot in such cases appeared very dark under artificial light; thus giving the appearance of inferior dyeing.

*Presented at meeting, Piedmont Section, May 7, 1938.

**Superintendent of Dyeing, May Hosiery Mills, Burlington, N. C.

Then, dyestuff manufacturers were appealed to, and as usual they pulled out of their bag of tricks colors that were changeable from daylight to artificial light, equally as satisfying as those for silk, and the result today—practically every type of hosiery is matched and sold in iridescent shades, including the much disliked Bemberg welt, which looks fairly well dressed up in these shades.

The shades obtained today have in daylight a slight bluish-pink caste, and under artificial light a decided red caste. These shades must be so matched against the submitted sample as to look the same in both lights, and for this work, to get the best result, one should have a double MacBeth Daylight Lamp. With the aid of this lamp it is possible to switch from day to artificial light at once; thus enabling one to detect the necessary color for perfect color blending. Without this light it is almost impossible to obtain exact matches. The secret of exact matching in iridescent shades is the use of the same dyestuffs which are used in the submitted sample. Oftentimes this sample is very flat and does not have as great a degree of iridescence as the usual type iridescent colors give. Should this be the case it is then necessary to use a small percent of non-iridescent color.

The colors used in dyeing iridescent shades are practically the same in all mills. A silk red, yellow, and violet, which feeds on fairly well, makes up the necessary formulae. However, many are experimenting with new colors, and are greatly improving the light and wash-fastness by adopting new colors, or adding parts of new with present colors.

If the style of hose should contain a cotton insole, union is much easier to control if direct colors red, yellow, and violet, similar to the silk ones are used. A peculiar characteristic of direct violets used for dyeing iridescent shades is their sensitivity to heat. While hot they assume an unusual red caste, but when cool return to their normal blue caste. This renders matching very slow and uncertain. By holding the sample over a small perforated pipe which emits live steam, the sample quickly returns to its original blue caste.

As stated before, the methods of degumming and dyeing vary according to the dyers individual ideas. The more general method, the writer believes, is to remove thoroughly the seracin gum and dye in a neutral bath with a good grade of sulfonated castor oil. The shades are much easier to match from one lot or batch to the next, and upon good authority, the colors are faster to washing. Whereas in the one bath operation, due to variations in sizes of lots and the poor affinity for some of the colors, a great many additions are required to obtain correct shades. Since production is the cry today, and since all hosiery requires some finish for handling and improved appearance, the quicker the lots can be removed from the boiling liquor, the more superior the handle and appearance will be.

The majority of mills finish their iridescent shades in the same manner as their regular shades. Some mills, however, use a very small percent of duller to overcome the tendency towards flatness and less brilliance. Since brilliance is one of the outstanding requirements, about half the amount of duller is necessary. Some manufacturers of finishing compounds claim they have products which increase the sparkle and brilliance, and which also give more clearness and definiteness to the pattern; thus making the stocking more attractive. Perhaps there are those present who can verify this statement.

One of the exasperating perplexities of certain dyestuffs is the fact that when used alone they are fairly fast to light, but when used in combination with other colors, become very fugitive. Some colors fade faster in weak light with high humidity than in perfectly dry atmosphere and intense light.

With colors possessing these latter abnormalities the light fastness may be greatly increased by the use of water repellents in the finishing bath.

Extreme care should be exercised after the hose have been finished that they are extracted immediately and not allowed to remain wet very long, since one particular color used by many mills has a tendency to crock, should the hose dry while in the truck.

In conclusion, shall we say that we of the hosiery industry are rather proud of the success of our brain child. It may be because we so feared its arrival. And we hope that our friends, the dyestuff manufacturers will soon produce colors of the required beauty with fastness[1]. And also, may the writer inject the fear that unless some quick action is taken anticipating the approach of the hot weather, this fashion may be subjected to a severe test, since neither merchant nor consumer can be interested very long in hosiery that fades or streaks.

[1]The writer is glad to note before this article goes to press that colors that will give fastness are now obtainable from the leading dyestuff manufacturers.

DISCUSSION

Mr. Miller: I would like to ask if you have found a violet that has a good fastness to sunlight and washing, where the dyeing qualities are very good.

Mr. Dixon: I might say that some of the Milling violets rate about four to light fastness against the commonly used wool violet 4BN which rates from 1-2 to light. While this is not perfect it is a great improvement.

Mr. Miller: Do you think treatment after dyeing with acetic acid has any effect on fastness?

Mr. Dixon: It does not to light. It may improve to washing slightly.

Mr. H. Grady Miller: Mr. Dixon mentioned that we were looking for some fast colors. I have experimented with quite a few of the fast colors recently coming on the market, and although they have some iridescence, I think they lose 25 to 40 per cent of iridescence, although the

trade is calling for fast colors. We cannot give great iridescence and great fastness at the same time. We have to sacrifice either light or fastness to washing.

It is also a problem that the ladies will wash their hose and hang them on the radiator to dry, or in direct sunlight, and we are going to have streaks, and I am almost sure Mr. Dixon has found the same problem.

Mr. Dixon, have you any suggestions by which we could get more iridescence and also get fastness to light and washing?

Mr. Dixon: I imagine that your experimenting is about as up to date as that of anybody in the territory, and I do not think that anything can be added to what you have already said. There may be some person who can give a little more light on that subject, some of the dyestuff people, or some member of the association.

Mr. H. Grady Miller: There is one other problem I would like to bring up. I am in a mill which produces possibly 600 dozen full-fashioned a day. Since January first we have had 142 special shades. Of these, we have had the same name color five or six times. In some mills it is possible to ship overage or underage of whatever is dyed but in some cases everything left over has to be thrown back for re-dyeing.

For instance, we have six different shades of crab apple, with very little difference in shades, and I am sure there should be one standard shade and not six different shades in a mill of one color.

I think it would be a good thing if this committee of dyers could get together and establish one standard shade of colors. It is true that some mills are able to ship underage or overage. In their anxiety to make a sale, some salesmen promise the buyer anything they want, to get the order, but it does not help the mill. Every shade matched up costs $25 or more on account of the overage and underage and having seconds and re-dyes, and every new shade has to be matched.

Mr. Dixon: That has been a problem for years and there does not seem to be very much relief, it is even growing worse if anything.

Mr. Miller: The standard shades do not mean very much any more because we have special shades with the same standard names, also we have the Berkshire shade and the Nolde and Horst shades, and all of them have a slight difference. If the mills would get together and agree on fifteen or twenty shades, very much better stock could be kept and much less trouble in the dye house, and much more profit for the mills.

Dr. Rupp: I gather from this discussion that suitability of fast dyes for iridescent colors is quite a problem.

Mr. Dixon: The degree of fastness wanted in the trade to meet the requirements I do not think has been developed thus far.

Dr. Rupp: Is there anybody who has any suggestions to offer that might contribute to the industry along those lines?

Mr. Miller: Some of the mills where the dyers have the backing of the shipping department, if a shade is close, have authority to substitute, which of course, is all right and does not hurt so much. I know of one mill adjoining our state, in Lynchburg, where they carry between ten and fifteen shades, and if someone sends in a special shade, and it is close to one of their regular shades, then this regular mill shade is substituted for the new special, and labeled as the color shade ordered, but a lot of the mills haven't got the nerve to substitute shades for their own benefit.

Dr. Rupp: I gather from this that the iridescent hosiery dyer has to have plenty of nerve.

Mr. Miller: I do not use the MacBeth light, but I do try to match all my iridescents in the early morning. In the afternoon I seem to get a very different result. On the other hand, I let every shade get tremendously yellow so that I would not even pass it myself, but after it ages and cools, it matches the shade fairly close. I never say I match it exactly. That is impossible.

CALENDAR OF COMING EVENTS

Meeting, Mid-West Section, Bismark Hotel, Chicago, Ill., October 8, 1938.

* * *

Meeting, Piedmont Section, Hotel Charlotte, Charlotte, N. C., October 8, 1938.

Meeting, New York Section, Swiss Chalet, Rochelle Park, N. J., October 28, 1938.

* * *

Meeting, Philadelphia Section, Penn Athletic Club, Philadelphia, Pa., October 28, 1938.

* * *

Annual Meeting and Convention, Atlanta Biltmore Hotel, Atlanta, Ga., December 2 and 3, 1938.

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NOTE:—The following represents an expression of opinion on the part of a textile chemist in regard to an existing situation and does not necessarily reflect the views of the DYESTUFF REPORTER. We will be interested to learn of the reaction of textile chemical and dyestuff manufacturers as well as textile chemists and dyers to the subject discussed.—EDITOR.

THE PHILOSOPHY OF TRADE NAMES

WE have had some contact through a number of years with things practical and commercial as well as technical and scientific. After all this time we are still led to wonder whether there is anything approaching a philosophy of trade names.

The dyestuff situation has apparently gone so far as to be hopeless. If we wish to use dyes with some thought to their chemical nature we have to provide ourselves with a suitable and expensive library and hope for the best. The A.A.T.C.C. Year Book is very helpful on American colors but the Colour Index to which it refers for final information is already a decade behind. Schulz, now Schulz and Lehmann, is offered in recent editions at prices which would require action by the board of directors if one thought of adding it to his working library.

We seem to be getting into the same sort of situation with the great and rapidly growing field of assistants and chemicals for dyeing and finishing, although some companies are very open minded about disclosing the chemical composition of their products. We users cannot expect full details in all cases and do not need them but a statement as to the general nature of an unfamiliar product can sometimes be very helpful without disclosing data which are of confidential value to its maker.

The Alphabetical List of Textile Chemical Specialties in the A.A.T.C.C. Year Book is a most commendable and useful start in this direction.

We wonder why some reputable widely advertised products are not found in such a list. Their general nature soon becomes known to competitors, so there is little possible gain on that score in not releasing general information. On the other hand no intelligent user will think them strange and miraculous panaceas, no matter how much mystery is attached to them—at least, not for long. Also, one is led to wonder whether the material is something of a hoax, or on the order of a patent medicine, which will hardly stand disclosure of its contents.

Which is worth the most to the maker and seller, the mystery value to the uninformed buyers, who seem definitely on the decrease; or some inkling of the true nature and value of the material to the intelligent buyers and users whose tribe seems to be rapidly increasing?

To illustrate, a chemist who thinks he has a use for which a quaternary ammonium compound is best suited would like to know who makes such compounds and what kinds are available. If sulfonated alkyl naphthalene derivatives are of particular interest he will try only the ones which are well known unless the manufacturers who have been more secretive as to the nature of such products make known that they also have them.

We suspect that chemists shy away from materials with strange names and undisclosed nature if others of known identity are available. Hence, in the long run would it not be better for all concerned to make the informative policy more general? Is there still some thought of kidding the customer through the use of obscure names and descriptions?

Incidentally, there is already at least one whole book devoted to a list and descriptions of "Textilhilfsmittel," so it is not strange if the user gets a little alarmed at what he may have to face in the future in his quest for suitable materials at reasonable money value (if the present-day flood of patents means anything).

The names of chemical materials, if they have any resemblance at all to the chemical names, or reference to chemical characteristics, might at least remain somewhat true to character. It is hard to see why anyone would call *beta*-naphthol "developer A" if he stopped to think at all about it, particularly when there is also an alpha naphthol. If the name is to carry a letter why not tell or imply by the letter B or some similar mark that it is beta naphthol (if we are to assume that the simple name beta naphthol is not suitable nor desired)? The makers seem to have agreed pretty well on Z as the key letter for phenyl methyl pyrazolone (Developer Z, etc.). Why cannot the names of other developers have key letters?

It will be argued that it is now too late to change names into a more convenient and simple system. However, no such argument seems to bother a manufacturer who takes a notion to change the name of a line of products. One of the prize examples is a group well known for some time in the European literature and known here for some

years under the same names and partly, at least, the same letters and numbers. Suddenly a change was announced and not even the distinctive numerals were retained. Current users, of course, could note the new names and were probably not bothered much. But if someone not familiar with these products sees their names in a foreign publication or in some earlier American writing, without the manufacturer's name, and wants to try them he will not find these names now in his American list nor any cross reference to them. If not already discouraged he is very likely to lose considerable time, as well as his enthusiasm, in trying to locate them.

There may have been some good reason for changing but it seems foolish and unnecessary to one who wishes to keep informed as to what is on the market; and who appreciates the value of published information which, of course, is automatically cancelled when the names are changed and lost to current use.

Another weird practice is that of selling the same thing under two or three different names, one for the textile trade, another for other lines and perhaps a third on packages for household use. So, if one sees a product in the kitchen which might fill a need at the plant, or reads about it in a periodical concerned with some other trade he has to write to find out what it is and may discover that he already has it in his own drug room sold under another name and already in use in his plant for some other purpose.

Is it not like selling (and advertising) Dromedary or Ancient Silver cigarettes or tooth paste under these names to lawyers, for example, and under some other names to operators of hardware or clothing stores? Why wouldn't that be good business, too? Probably because the more widely a product is known under one good trade name the better. One who is unfamiliar with the philosophy or psychology of trade names would expect the same principle to apply to any material of wide use.

We wonder if there is any real sense to it all when nomenclature could be simplified a good deal without much trouble, or at least kept from getting much more complicated. Even such little aggravations as those mentioned, whether in purchasing department, laboratory, or out in the mill can easily contribute to loss of good will.

Contributed Editorial.

TECHNICAL NOTES FROM FOREIGN SOURCES

Contributions to the Theory of Acid Wool Dyeing (IVth Communication)

Dr. W. Ender and Dr. A. Mueller—Mell. Textil-Ber. 18, 906 (1937).—Three papers in this series have been reviewed lately.

The present section has as a subtitle "On the Acid Nature of the Free Sulfonic Acids of some Acid Wool Dyestuffs".

It may be recalled that the earlier parts dealt with a study of the dyeing of wool with the carefully prepared and purified dye-acids of certain acid wool dyestuffs, with the purpose of following up the stages of the process in baths free from the disturbing influence of electrolytes always present in commercial dyestuffs (dyeing with aqueous solutions of the dye-acids alone, instead of the sodium salts, the dyestuffs themselves). This present part is a physico-chemical study of some of these pure dye-acids, as acids; those studied are the dye-acids of

1—Orange II
2—Orange RO
3—Dyestuff Acid No. 10
} containing one sulfo-group

4—Orange GG
5—Crystal Ponceau 6R
6—Fulling Red G
7—Acid Anthracene Red G
8—Dye-Acid No. 5 (Wool Yellow)
9—Dye-Acid No. 9
10—Dye-Acid No. 11
} containing two sulfo-groups

11—Naphthol Red S } containing three sulfo-groups

Of the results of the authors' study, three graphs are given (pH curves).

In closing, the authors state their belief that only a gradual difference (not one of characteristic nature) exists between the ordinary acid wool dyestuffs and the substantive dyestuffs. Those classified as acid wool dyestuffs are fixed upon the wool first of all through salt-formation between their sulfonic groups and the basic groups of the wool; and the union may be strengthened further by affinities, perhaps of a physical nature, between other parts of the molecule of dyestuff and fiber respectively. The more complicated the structure of the dyestuff, the more these collateral attachments may occur, and so much more fast will be the total union (dyestuffs for fulling, etc.). Finally, this power of collateral union, outside of the salt-formation, may reach so far that a given dyestuff may to a certain extent be fixed well upon a fiber which contains no basic groups (thus, a direct cotton dyestuff). If such a dyestuff be dyed upon wool, then the sulfonic groups add their influence to this substantivity, and the dyestuff will be anchored in the two ways simultaneously. Dyeings upon wool with direct cotton colors are well known to possess specifically high fastness toward water and washing.

Contributions to the Theory of Acid Wool Dyeing (V)

Dr. W. Ender and Dr. A. Mueller—Mell. Textil-Ber. 18, 991 (1937).—Previous sections of this paper have been noted in these columns, the last one just preceding.

In this present communication, the authors give the results of their study of the connection between level-dyeing properties, fastness to water, rate of absorption,

(Continued on page 533)

The Canvas Disc

Wetting Test*

H. SEYFERTH and O. M. MORGAN

ABSTRACT

The Canvas Disc Wetting Test is discussed and compared with the Official Method of the American Association of Textile Chemists & Colorists. The Canvas Disc Wetting Test is of great practical value as an alternate to the present Official Method, due to the much shorter testing time involved, the ease of procuring data at low concentrations of surface active agents as are used in mill operations, and the easy availability of testing supplies and apparatus. Wetting data by both methods are presented for five currently used surface active agents at three temperatures and five concentrations.

DURING the last few years the increasing importance and use of organic compounds possessing surface active properties has necessitated the formulation of analytical methods for the evaluation of these products. Because of the great chemical stability of this general class of compounds as well as the wide variety of compounds now in use, the consumer has found it more convenient to measure the physical properties of these compounds or the physical effects obtained by their use rather than to attempt their evaluation by chemical analysis.

All surface active agents possess the ability of wetting textiles, metal or glass surfaces, etc. The rate of wetting or the "wetting ability" of surface active agents is commonly used to determine their comparative efficiencies and comparative money values. Since the wetting ability of a product is a function of its concentration, its wetting ability may be utilized to determine its concentration in processing solutions. This is of particular interest in the control of solutions of surface active agents used in continuous processes where the concentration must be kept between certain well-defined limits.

Because surface active agents are normally used in concentrations between 0.5 and 5.0 grams per liter, a method for determining wetting ability must be sensitive within these concentration ranges for the majority of commonly used surface active agents. The method must be rapid, simple and economical, requiring a minimum of labor, time and apparatus.

The literature contains a large number of methods for the determination of the wetting ability of surface active compounds. These methods may be divided into five classes as follows:

I—Sinking time of textiles.
  a. Textile sinking from the surface of the solution.
  b. Textile sinking after submersion in the solution.

II—Measurement of the quantity of solution penetrating into textile material.

III—Measurement of the capillary rise of surface active product solutions in textile fabrics.

IV—Measurement of the surface tension of surface active product solutions.

V—Miscellaneous methods.

In connection with Class Ia, Bernardy[4] measured the sinking time of cotton skeins placed on the surface of a wetting solution. In similar fashion Krais and Gensel[14] measured the sinking time of cotton threads, Auerbach[3] the sinking time of 4 x 4 cm. pieces of wool fabric and Volz[24] the sinking time of cotton threads in an agitated solution. Under Class Ib Ruperti[20] measured the sinking time of a hydrometer to which pieces of fabric were attached. An anonymous author[2] measured the sinking time of a piece of fabric submerged in a solution by holding it under a funnel. Lang[16] measured the sinking time of a 1 x 1 cm. piece of wool cloth. Ristenpart and Petzold[19] determined the collapsing time of a vertical thread held under the surface of the solution. Landolt[15] determined the sinking time of a small piece of wool fabric fastened to a thread beneath the surface of the solution. Draves and Clarkson[5] measured the sinking time of 5 gram cotton skeins submerged in the solution by means of a 1.5 gram sinker and a 20 gram anchor. This latter method will be discussed more fully in a later section of this paper.

In Class II Herbig[6] determined quantitatively the amount of solution absorbed by textile materials in a fixed period of time. This method was later improved by Herbig and Seyferth[7]. Seck and Lachmann[21] measured the increase in weight of 5 x 6 cm. pieces of cotton fabric after immersion for a given period of time in a solution of a surface active product. Kind, Auerbach and Munch[13] made similar determinations on bundles of cotton skeins. Herbig and Seyferth[8] improved the previous Herbig method[6, 7] by the addition of automatic centrifuging apparatus. Lehner and Smith[17] proposed a centrifugal method for the evaluation of textile penetration assistants while Kennedy[11] applied certain variations to the Herbig method[8].

The capillary rise method of Herbig and Seyferth[9] is

*Reprinted from September, 1938, *Dyestuffs*.

the only method recorded in Class III. This consisted of measuring the capillary rise of wetting solutions on cotton fabric but did not meet with a great deal of success because of the non-uniformity of the cottton fabric used.

In Class IV Herbig and Seyferth[7] measured the surface tension of wetting solutions and related this to their wetting ability. Kafka[10] likewise measured the surface tension of wetting solutions as did also Krais and Gensel[14], Kind and Auerbach[12], Landolt[15] and Stiller[22], the latter using an improved capillary rise method.

Under miscellaneous methods in Class V may be listed the method of Lindner and Zickermann[18] which involves the weighing of a paraffin coated disc before and after dipping in a wetting solution and the method of Stocker[23] who measured mechanically the rate and amount of shrinkage in a cotton thread immersed in a wetting solution.

DRAVES AND CLARKSON WETTING TEST

The Draves and Clarkson wetting test[1,5] consists of measuring the sinking time of 5 gram, 18 inch circumference, unboiled cotton skeins, the skeins being submerged in 500 cc. of the wetting solution contained in a 500 cc. graduated cylinder by means of a 1.5 gram hook and a 20 gram anchor. The anchor is suspended from the hook by means of a 1-inch, strong, fine linen thread. Pins are driven into each side of the anchor to center it in the bottom of the cylinder.

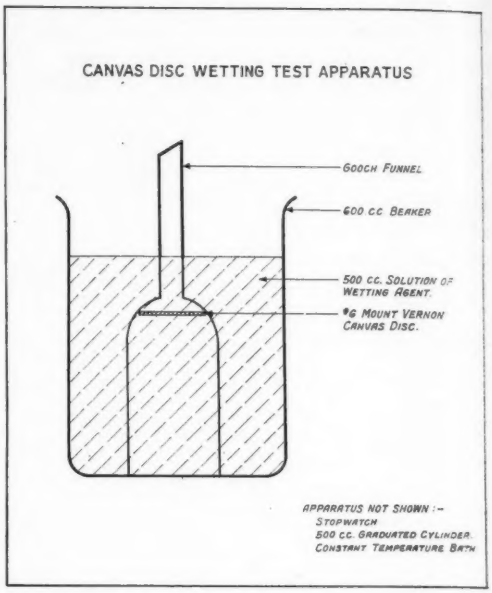
In making a determination one end of the 5 gram skein is fastened to the hook and anchor and the opposite end of the skein is cut through with shears, this end being left open and loose. The time elapsing between the entering of the skein into the solution and the moment when the hook touches the bottom of the cylinder is measured with a stopwatch and recorded as the sinking time. It is recommended that the tests be performed at 25° C. and that the average of four sinking times be taken for each concentration of wetting agent. This test has been adopted as the official test for the evaluation of wetting agents by the American Association of Textile Chemists and Colorists[1] and will be referred to hereafter as the "Official Method."

CANVAS DISC WETTING TEST

The wetting test that has been found to be of greatest utility by the authors is the "Canvas Disc Wetting Test." In brief this test consists of measuring the sinking time of a 1-inch diameter No. 6 Mount Vernon canvas disc under definite conditions of temperature, concentration of surface active agent, water hardness and hydrogen ion concentration.

The canvas discs are punched out with a 1-inch steel die or, if such a die is not available, the discs may be cut out with scissors using a twenty-five cent piece as a pattern, being sure that the hands are clean so that no grease is added to the canvas.

Five hundred cc. of the solution to be tested is placed in



a 600 cc. beaker, a Gooch funnel having a 1.5 inch diameter and a barrel 3 inches long is inverted in the solution and the whole is brought to the desired temperature. Working rapidly the Gooch funnel is removed from the solution, a canvas disc is placed in the funnel and the funnel again is inverted in the solution, at the same time starting a stopwatch. The funnel immerses the canvas disc in the solution to a depth of about 0.5 inches. The time required for the disc to begin to sink is measured with a stopwatch and is recorded as the "wetting time." Where accurate data are required the average of at least four such wetting times is taken as standard. This method will be referred to hereafter as the "Canvas Disc Method."

A definite advantage of the Canvas Disc Method is the availability of all raw materials needed for the test. The canvas that is used, Mount Vernon No. 6, is nationally available and the winding and weighing of cotton skeins, as in the Official Method is obviated. The other apparatus is available in any laboratory.

A No. 6 canvas was chosen for this work for the following reasons: A coarser variety of canvas is too difficult to wet and too much time is required to conduct the tests. A finer variety of canvas is too easily wetted and does not provide sufficient differentiation between different products or between different concentrations of the same product. In other words the choice of a No. 6 canvas effects a balance between time saving and testing efficiency.

COMPARISON OF CANVAS DISC METHOD AND OFFICIAL METHOD

In the tables and graphs which follow is presented a comparison of the Canvas Disc Method and the Official Method covering five currently marketed surface active agents. In this work concentrations of 0.5 1.0, 2.0, 3.0

and 4.0 grams per liter of surface active agents were used in neutral distilled water solutions at temperatures of 25°, 50° and 75° C. The wetting times of four discs or four skeins are recorded. Mean wetting times are calculated as well as maximum and minimum deviations from the mean wetting times. The percentage time saving effected by the use of the Canvas Disc Method also is indicated.

Complete data are presented for one product, R — $CON(CH_3)C_2H_4SO_3Na$, while the data for the other products are presented only in summary form. The five products tested are listed below according to their chemical constitution:

R'Ar—SO_3Na
R_1 — OSO_3Na
R_2 — OSO_3Na
R — $CON(CH_3)C_2H_4SO_3Na$
R — $COOC_2H_4SO_3Na$

NOTE: R' = Non-fatty alkyl group
R, R_1, R_2 = Various fatty alkyl groupings
Ar = Aromatic group

TABLE 1
R — $CON(CH_3)C_2H_4SO_3Na$
Temperature of Solution: 25° C.

	Canvas Disc Method					*Official Method*				
Concentration (grams per liter)....	0.5	1.0	2.0	3.0	4.0	0.5	1.0	2.0	3.0	4.0
Wetting Time (seconds).....	275	190	76	41	29	1,800+	540	136	98	81
	280	189	81	48	30	1,800+	720	133	95	80
	250	190	79	43	33	1,800+	755	149	97	79
	280	196	82	49	27	1,800+	660	147	99	79
Mean Wetting Time (seconds).....	271	191	79	45	30	1,800+	669	141	97	80
Maximum Deviation from Mean (%)	8	3	4	9	10	....	19	6	2	1
Average Maximum Devisation (%).			7					7		
Minimum Deviation from Mean (%)	1	1	3	4	3	....	1	4	1	1
Average Minimum Deviation (%)..			2					2		
Total Testing Time for Series 0.1-0.4% (seconds)			1,383					3,948		
Time Saved by Canvas Disc Method (%)					65.					

TABLE 2
R — $CON(CH_3)C_2H_4SO_3Na$
Temperature of Solution: 50° C.

	Canvas Disc Method					*Official Method*				
Concentration (grams per liter).....	0.5	1.0	2.0	3.0	4.0	0.5	1.0	2.0	3.0	4.0
Wetting Time (seconds).....	177	91	40	29	16	1,800+	178	59	33	29
	167	88	42	28	18	1,800+	179	51	31	27
	195	88	35	28	15	1,800+	168	56	34	28
	204	84	42	25	17	1,800+	180	50	33	24
Mean Wetting Time (seconds).....	186	88	40	27	16	1,800+	176	54	33	27
Maximum Deviation from Mean (%)	10	5	12	7	12	....	5	9	6	11
Average Maximum Deviation (%)..			9					8		
Minimum Deviation from Mean (%)	5	3	5	4	6	....	1	4	3	4
Average Minimum Deviation (%)...			5					3		
Total Testing Time for Series 0.1-0.4% (seconds)			686					1,160		
Time Saved by Canvas Disc Method (%)					41					

TABLE 3
R — $CON(CH_3)C_2H_4SO_3Na$
Temperature of Solution: 75° C.

	Canvas Disc Method					*Official Method*				
Concentration (grams per liter)	0.5	1.0	2.0	3.0	4.0	0.5	1.0	2.0	3.0	4.0
Wetting Time (seconds)	103	63	34	20	18	1,800+	333	66	25	15
	85	57	36	27	17	1,800+	230	52	26	14
	105	57	38	23	17	1,800+	315	65	22	15
	82	54	33	29	19	1,800+	230	55	23	15
Mean Wetting Time (seconds)	94	58	35	25	18	1,800+	277	59	24	15
Maximum Deviation from Mean (%)	13	9	9	20	6	....	20	12	8	7
Average Maximum Deviation (%)			11					12		
Minimum Deviation from Mean (%)	10	2	3	8	6	....	14	7	4	7
Average Minimum Deviation (%)			6					8		
Total Testing Time for Series 0.1-0.4% (seconds)			542					1,501		
Time Saved by Canvas Disc Method (%)					64					

TABLE 4
Temperature of Solution: 25° C.

	Wetting Time (Seconds)									
Concentration (grams per liter)	0.5		1.0		2.0		3.0		4.0	
Product	CD	O	CD	O	CD	O	CD	O	CD	O
R'Ar — SO_3Na	253	1,800+	127	539	36	38	21	23	15	18
R_1 — OSO_3Na	529	1,800+	135	178	35	42	21	28	14	19
R_2 — OSO_3Na	892	1,800+	442	1,800+	176	280	123	140	80	100
R — $CON(CH_3)C_2H_4SO_3Na$	271	1,800+	191	669	79	141	45	97	30	80
R — $COOC_2H_4SO_3Na$	344	1,800+	121	371	59	134	42	91	34	61

Note: CD—Canvas Disc Method; O—Official Method.

TABLE 5
Temperature of Solution: 50° C.

	Wetting Time (Seconds)									
Concentration (grams per liter)	0.5		1.0		2.0		3.0		4.0	
Product	CD	O	CD	O	CD	O	CD	O	CD	O
R'Ar — SO_3Na	173	1,800+	87	625	29	25	14	13	8	9
R_1 — OSO_3Na	246	1,800+	84	266	22	24	13	12	7	8
R_2 — OSO_3Na	390	1,800+	191	1,460	86	106	51	53	32	44
R — $CON(CH_3)C_2H_4SO_3Na$	186	1,800+	88	176	40	54	27	33	16	27
R — $COOC_2H_4SO_3Na$	155	1,800+	64	90	24	40	14	26	9	20

Note: CD—Canvas Disc Method; O—Official Method.

TABLE 6
Temperature of Solution: 75° C.

	Wetting Time (Seconds)									
Concentration (grams per liter)	0.5		1.0		2.0		3.0		4.0	
Product	CD	O	CD	O	CD	O	CD	O	CD	O
R'Ar — SO_3Na	104	1,800+	57	812	35	47	19	18	12	9
R_1 — OSO_3Na	130	1,800+	66	600	30	29	24	12	12	8
R_2 — OSO_3Na	219	1,800+	108	926	51	266	40	57	25	41
R — $CON(CH_3)C_2H_4SO_3Na$	94	1,800+	58	277	35	59	25	24	18	15
R — $COOC_2H_4SO_3Na$	91	1,800+	52	326	31	35	21	17	13	11

Note: CD—Canvas Disc Method; O—Official Method.

TABLE 7
Summary of Maximum Deviations from Mean Wetting Time

Product	*Canvas Disc Method*			*Official Method*		
Temperature of Solution	25° C.	50° C.	75° C.	25° C.	50° C.	75° C.
R'Ar — SO_3Na	16%	12%	10%	17%	12%	14%
R_1 — OSO_3Na	12	5	12	8	22	5
R_2 — OSO_3Na	7	6	8	10	10	15
R — $CON(CH_3)C_2H_4SO_3Na$	7	9	11	7	8	12
R — $COOC_2H_4SO_3Na$	6	12	8	9	13	15
Average Maximum Deviation from Mean Wetting Time		9.4%			11.8%	

TABLE 8
Summary of Minimum Deviations from Mean Wetting Time

Product	*Canvas Disc Method*			*Official Method*		
Temperature of Solution	25° C.	50° C.	75° C.	25° C.	50° C.	75° C.
R'Ar — SO_3Na	6%	8%	6%	3%	6%	6%
R_1 — OSO_3Na	5	3	6	3	4	2
R_2 — OSO_3Na	2	2	4	3	3	4
R — $CON(CH_3)C_2H_4SO_3Na$	2	5	6	2	3	8
R — $COOC_2H_4SO_3Na$	2	5	4	2	3	7
Average Minimum Deviation from Mean Wetting Time		4.4 %			3.9%	

TABLE 9
Summary of Percentage Time Saved by Canvas Disc Method

Product	*Percentage Time Saving*		
Temperature of Solution	25° C.	50° C.	75° C.
R'Ar — SO_3Na	68%	78%	86%
R_1 — OSO_3Na	23	59	80
R_2 — OSO_3Na	65	78	82
R — $CON(CH_3)C_2H_4SO_3Na$	65	41	64
R — $COOC_2H_4SO_3Na$	61	37	70
Average Time Saving	56.4%	58.6%	76.4%
Average Time Saving for All Testing Temperatures		63.8%	

DISCUSSION

Tables 1, 2 and 3 contain a complete record of the wetting data for the surface active product R — $CON(CH_3)$-$C_2H_4SO_3Na$. When using the Canvas Disc Method, the wetting times of four canvas discs as well as their mean wetting time are recorded. When using the Official Method the wetting times of four cotton skeins as well as their mean wetting time are recorded. From this data maximum and minimum percentage deviations from the mean wetting time are calculated as well as an average of each of these deviations.

The total testing times for the concentration series 1 gram per liter to 4 grams per liter are calculated for both testing methods. The concentration, 0.5 gram per liter, was not included in this comparison since the wetting times obtained by the Official Method at this concentration were too high to justify a comparison. The percentage time saved by the use of the Canvas Disc Method in preference to the Official Method is calculated at the end of each table.

Tables 4, 5 and 6 present wetting data by the Canvas Disc Method and by the Official Method for five surface active compounds at 25° C., 50° C. and 75° C., respectively. The data contained in Tables 4, 5, and 6 are presented in ordinary squared co-ordinate plots in Figures 1 to 5 and in log-log co-ordinate plots in Figures 6 to 10. Draves & Clarkson[5] recommend the use of log-log plots in connection with their tests. From a scientific point of view the use of this type of plot is excellent since it depicts the logarithmic proportionality between the concentration and the wetting ability of surface active products. However, because of the very limited use of logarithmic plots, their preparation and interpretation is rendered difficult to the average operator. Even though the use of ordinary, squared co-ordinate paper is productive of wetting time plots that are somewhat more bulky than the logarithmic plots it would appear that for the sake of simplicity the former plots should be used. For comparative purposes both types of plots are presented with this paper.

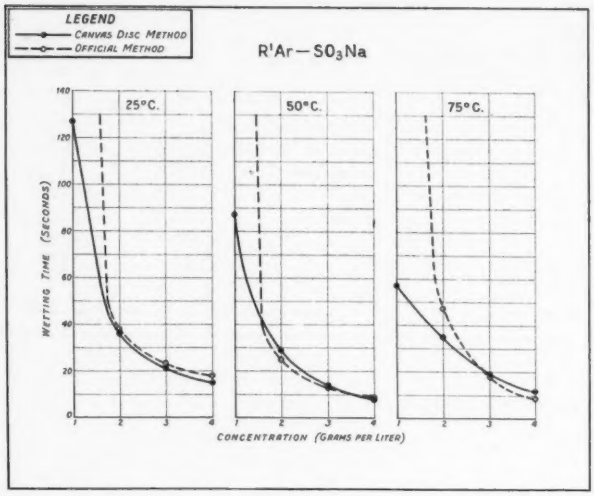


Fig. 1

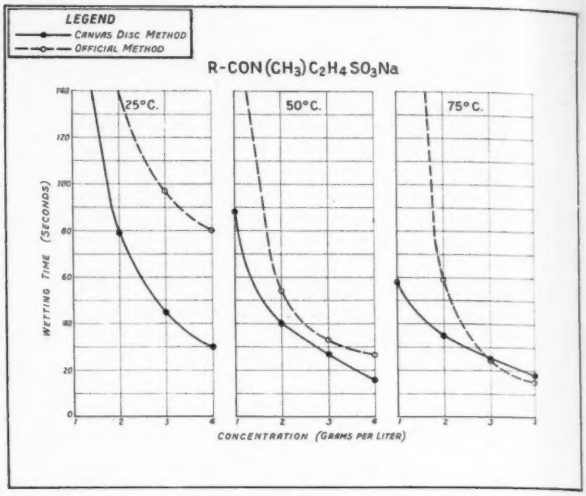


Fig. 4

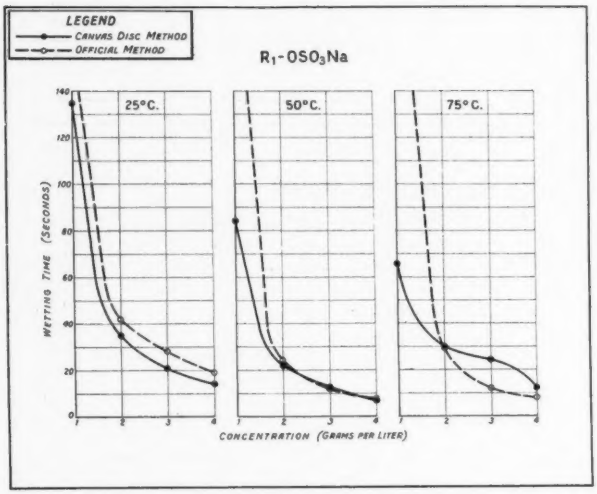


Fig. 2

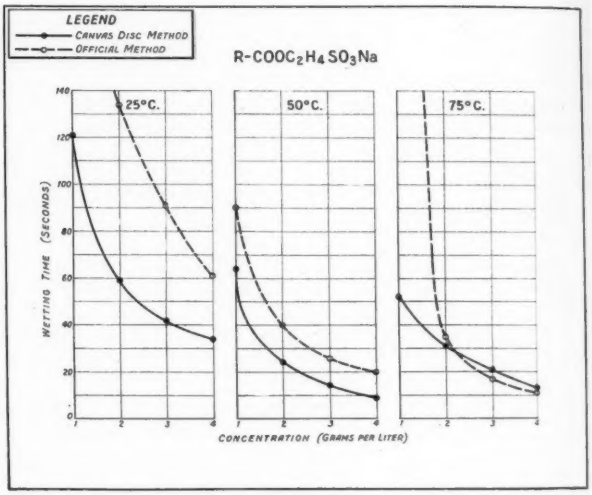


Fig. 5

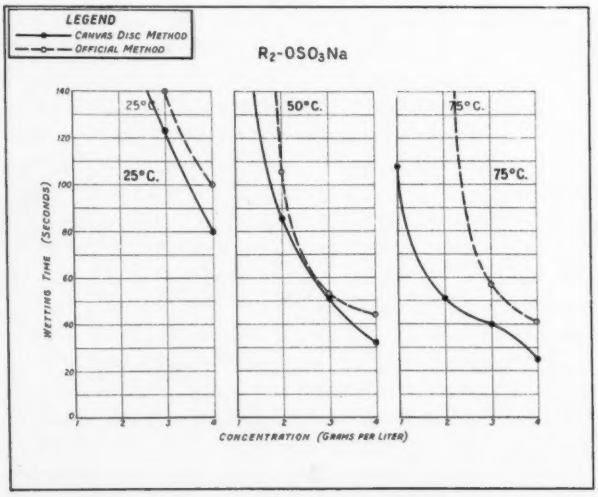


Fig. 3

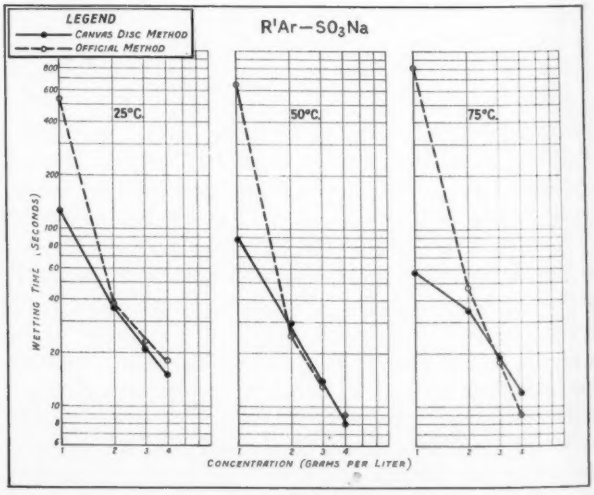


Fig. 6

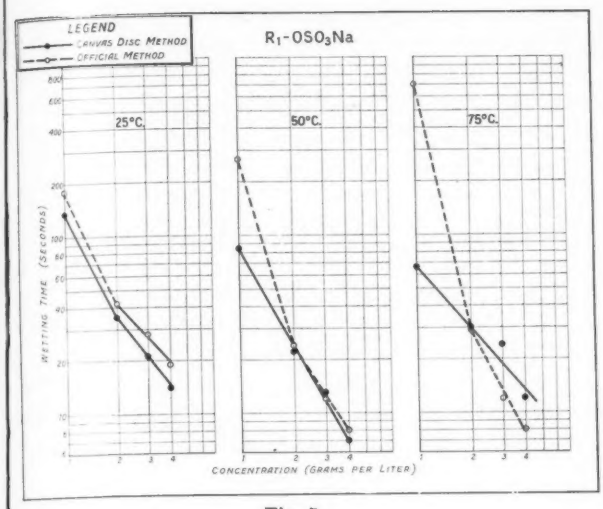


Fig. 7

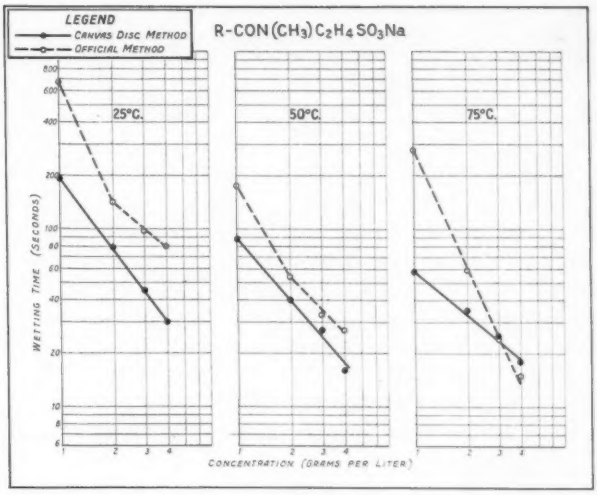


Fig. 9

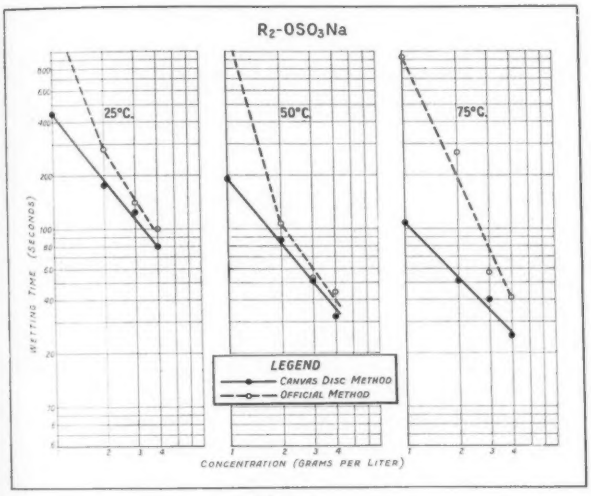


Fig. 8

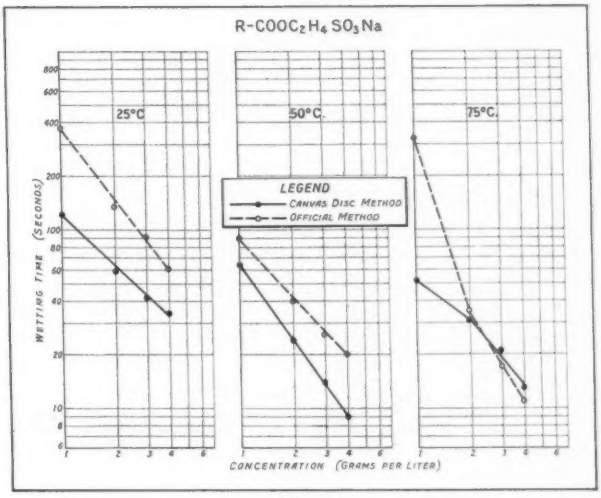


Fig. 10

A study of the wetting data in Tables 4, 5 and 6 and Figures 1 to 10 reveals a close parallelism between the results obtained by the Canvas Disc Method and the Official Method at concentrations of 1 gram per liter or higher. At concentrations of less than 1 gram per liter the wetting times obtained by the Official Method are abnormally high and, in our opinion, do not give the products full credit for their efficiency at these lower concentrations.

It will be noted in Tables 4, 5 and 6 that all the surface active products under consideration, when tested at a concentration of 0.5 gram per liter by the Official Method are indicated as being essentially valueless. Here again the Official Method is misleading since many processing operations exist where 0.5 gram per liter of a surface active agent is entirely adequate for wetting-out purposes. A much truer picture of the wetting ability of these surface active products at the lower concentrations is obtained by the use of the Canvas Disc Method. It is true that wetting efficiency decreases more rapidly as the concentration of wetting agent is decreased below 1 gram per liter, but this efficiency decrease is seldom as rapid as would be indicated by the results of the tests made by the Official Method.

ACCURACY OF CANVAS DISC AND OFFICIAL METHODS

In Tables 7 and 8 are presented the respective average maximum and minimum deviations from the mean wetting times as obtained by the Canvas Disc Method and the Official Method. It will be noted that the Official Method is productive of larger maximum deviations from the mean wetting time than is the Canvas Disc Method. This doubtless is due to the fact that there is more chance of air inclusion being retained by a skein than by a canvas disc. The air inclusion imparts buoyancy to the skein and increases the sinking time. Hence the average maxi-

mum deviation from the mean wetting time is 11.8 per cent for the Official Method and 9.4 per cent for the Canvas Disc Method.

The average minimum deviations from the mean wetting time is of the same order of magnitude for both testing methods, viz., 4.4 per cent for the Canvas Disc Method and 3.9 per cent for the Official Method. The fact that the minimum deviations from the mean wetting time are so much smaller than the maximum deviations indicates that the lower wetting times in any wetting series are more likely to be the correct data. In other words, errors due to included air buoyancy have not interfered where lower wetting times are obtained.

TIME SAVING BY USE OF CANVAS DISC WETTING TEST

When surface active products are used in concentrations of 2 grams per liter or higher the wetting times obtained by the Canvas Disc and Official Methods are of much the same order of magnitude. This may be noted in Tables 4, 5 and 6 and in Figures 1 to 10. However, when concentrations of less than 2 grams per liter are used the wetting time is much shorter by the Canvas Disc Method than by the Official Method. In determining the wetting efficiency and/or money value of a surface active product it is necessary to determine wetting times over a series of concentrations. Since most surface active agents are used at concentrations of less than 2 grams per liter, this range of concentrations must be carefully covered. The performance of this task using the Official Method is rather tedious due to the long wetting times involved, but may be completed in less than half the time by the use of the Canvas Disc Method.

Table 9 contains a summary of the time saved in the present experiments by the use of the Canvas Disc Method as compared with the Official Method. The average percentage time saving in this series is 63.8 per cent.

This time saving is calculated on the basis of one test being made at a time since this is all that can be conveniently handled by one operator when using the Official Method. However, when using the Canvas Disc Method two Gooch funnels may be lashed together with elastic bands, inserted in the 600 cc. beaker and the sinking times of two canvas discs are determined at once. Thus with two operations the four checks are obtained. If six checks are desired, three Gooch funnels may be lashed together and inserted into a 1,000 cc. beaker containing 675 cc. of the wetting solution. This quantity of solution gives the same liquid level with respect to the Gooch funnels as does 500 cc. of solution in a 600 cc. beaker. By using this method six check tests may be obtained in two operations. Hence the Canvas Disc Method effects time saving as follows when compared with the Official Method:

No. of Gooch Funnels Used	*Percentage Time Saving*
1	63.8%
2	81.9
3	86.9

SUMMARY

The foregoing data and text reveal the desirability of adopting the Canvas Disc Method for the evaluation of surface active products in preference to the Official Method for the following reasons:

1. The data obtained by the Canvas Disc Method are of more practical use to the mill operator because of the easy availability of data at low concentrations of surface active agents.
2. The percentage error involved by the use of the Canvas Disc Method is appreciably smaller than with the Official Method.
3. The efficiency of surface active products at low concentrations may be determined by the Canvas Disc Method with greater ease and accuracy than with the Official Method.
4. Much testing time can be saved by the use of the Canvas Disc Method in preference to the Official Method. In the present work a 63.8 per cent time saving is displayed. This is very important where the methods are used for concentration control purposes in plant processes.
5. The procuring and preparation of No. 6 canvas discs is much more simple than the winding and weighing of 5 gram cotton skeins such as are used in the Official Method.
6. The apparatus necessary for the Canvas Disc Method is available in any laboratory.

BIBLIOGRAPHY

[1]American Association of Textile Chemists and Colorists, Year Book, page 184 (1937).
[2]Anonymous, Deutsche Färberzeitung *64*, 235 (1928).
[3]Auerbach, J., Melliand Textilberichte *7*, 681 (1926).
[4]Bernardy, Leipziger Monatschrift für Textilindustrie *41*, 18 (1926).
[5]Draves, C. Z. and Clarkson, G. R., American Dyestuff Reporter *20*, 201 (1931).
[6]Herbig, W., Zeitschrift, für die gesamte Textilindustrie *25*, 221 and 230 (1922).
[7]Herbig, W. and Seyferth, H., Zeitschrift der deutschen Oel and Fettindustrie *45*, 751 (1925).
[8]Herbig, W. and Seyferth, H., Melliand Textilberichte *8*, 799 (1927).
[9]Herbig, W. and Seyferth, H., Zeitschrift der deutschen Oel and Fettindustrie *46*, 21 (1926).
[10]Kafka, H., Leipziger Monatschrift für Textilindustrie *41*, 426 (1926).
[11]Kennedy, T., The Dyer *74*, 389 (1935).
[12]Kind and Auerbach, Melliand Textilberichte *7*, 775 (1926).
[13]Kind, Auerbach and Munch, Melliand Textilberichte *8*, 1024 (1927).
[14]Krais and Gensel, Leipziger Monatschrift für Textilindustrie *41*, 237 (1926).
[15]Landolt, A., Melliand Textilberichte *9*, 759 (1928).
[16]Lang, Leipziger Monatschrift für Textilindustrie *43*, 115 (1928).
[17]Lehner, S. and Smith, J. E., American Dyestuff Reporter *22*, 689 (1933).
[18]Lindner, K., and Zickermann, J., Melliand Textilberichte *5*, 386 (1924).
[19]Ristenpart, E. and Petzold, K., Zeitschrift für die gesamte Textilindustrie *30*, 176 and 353 (1927).
[20]Ruperti, Melliand Textilberichte *7*, 936 (1926).
[21]Seck and Lachmann, Melliand Textilberichte *7*, 851 (1926).
[22]Stiller, M., Chemiker Zeitung *59*, 208 (1935).
[23]Stocker, J. F., Melliand Textilberichte *14*, 544 (1933).
[24]Volz, K., Zeitschrift für die gesamte Textilindustrie *30*, 338 (1927).

TECHNICAL NOTES FROM FOREIGN SOURCES

(Continued from page 524)

molecular magnitude, and constitution of certain typical acid wool dyestuffs.

A general rule arrived at in practical dyeing characterizes dyestuffs which level badly as faster to washing than dyestuffs which dye level without difficulty; and, as a corollary, it is generally held that a dyestuff will dye the more level, the more slowly it goes upon the fiber. Now, there are several well-known dyestuffs, some of which are completely exhausted from the bath in dyeing, while others of them leave the bath more or less colored under any condition. The former are dyestuffs which dye level, but are not fast to washing. An acid dyestuff dyes level with the more difficulty, the more fast it is afterward to washing; the dyestuffs which dye level do so because of the fact that they, after going upon the fiber (perhaps or probably) unevenly, are detached to some extent again by the hot bath, and are able to migrate from basic group to basic group, until a condition of equilibrium of distribution is reached. Those dyestuffs which yield dyeings fast to water, and are unevenly taken up, merely remain firmly fixed at the points where they go on first, and so the dyeings remain uneven. The items of fastness to water, capability of dyeing level, and the degree of exhaustion of the bath, are therefore closely related. But they give us no information about the question of rate absorption from the bath. The general rule arrived at in practice, that dyestuffs which are exhausted completely from the bath go upon the fiber rapidly, and vice versa, is not justified. It is quite possible that the equilibrium between wool and dyestuff acid, from a dyestuff which does not exhaust completely even after long boiling, is attained in a relatively shorter time than is the case with a dyestuff which goes upon the fiber more slowly, but which does exhaust completely after a longer period.

The authors include in the paper some swatches dyed with Crystal Ponceau 6R and with Fulling Red G, dyed with the purified dye acids (not the dyestuffs), as in previous communications. They discuss the results interestingly. It appears that, with Crystal Ponceau 6R (in these cases dyeings were carried out with 10 per cent Glauber's salt and 4 per cent of sulfuric acid), a dyestuff which goes on rapidly and level, the point of equivalence between wool and dyestuff acid is reached in a few minutes. Beyond this point no increase in depth of dyeing could be determined, and the bath was not exhausted. (Apparently this might mean also that the dyestuff-acid still in the bath continued to go upon the fiber, but that the dyestuff-acid-wool salt formed, the dyed fiber was from this point hydrolyzed *pari passu*, and turned back into the bath an amount of dyestuff-acid equal to the amount being taken on, molecule for molecule?) Fulling Red G, however, which has a better fastness to water, and dyes less level, than the Ponceau, goes on much more slowly, and exhausts from the bath completely. This proves at least that the degree of exhaustion, after the dyeing is actually complete, i.e., when the given amount of fiber has taken up all the dyestuff-acid which it can take up chemically, cannot be generally related to the rate of absorption, and that a low rate of absorption must not necessarily be correlated with good leveling properties. But all of the terms which have to be employed in these discussions, affinity, substantivity, rate of absorption, etc., have not yet been defined exactly. Oftentimes the term affinity, as used of a dyestuff in relation to a fiber, means in one case the rate of absorption, in another case fastness toward water. It would be better to use the term stability in the latter case (meaning fastness toward water, or hydrolyzability of the dyestuff acid-wool salt) instead of the term affinity. The latter would better be confined to the case of the degree of equilibrium of wool plus dyestuff-acid-dyed-fiber salt. The rate of absorption depends upon too many factors, for example, the size of molecule, the condition of aggregation, and the rate of diffusion of the dyestuff in the bath and in the wool fiber, as well as the degree of swelling of the wool fiber, to be able to afford any idea of the actual affinity of the dyestuff.

In practical work the opinion prevails, that more level dyeings can be attained by decreasing the rate of absorption; dyestuffs which do not dye level being dyed by making the bath acid with the weaker organic acids (formic, acetic), in order to liberate the dye-acid more slowly. But the alteration of the rate of absorption of a dyestuff has little effect upon level-dyeing properties. Of much more influence is the presence of buffers, sodium acetate or ammonium acetate (such substances would be formed to some extent by the addition of weak organic acids, but perhaps not sufficiently so), to raise the pH value of the bath. This is an important point. But a customary procedure, that of securing good levelling by entering the goods at a low temperature, and gradually bringing to the boil, is really of practical importance, for in this way it is possible to avoid the more serious inequalities in depth of dyeing which are encountered by entering the goods into a hot bath and rapidly bringing to a boil. Such inequalities can be encountered by careless dyeing with dyestuffs which ordinarily dye level; only, such cases can be saved by a longer boiling, the dyeings, as before mentioned, levelling out by migration of the dyestuff-acid from an overdyed area to an underdyed one.

The whole paper is fascinating in its clear definiteness.

Difficulties in the Dyeing of Wool-Celta-Acetate Mixtures

Gerd Nitschke—Monats. f. Textil-Ind. 53, 31 (1938).—An article of a practical, though general, nature, dealing principally with the problems of obtaining even dyeings upon material not a union, nor with effects, but of a

genuine mixed type—cases in which acetate Celta is an admixture with wool. The dyeings, as they affect the Celta component, are not generally satisfactory as to their fastness properties.

If the Celta is satisfactorily pre-dyed before being worked up with other fibers, the present problem does not exist, since Celta acetate can be satisfactorily dyed; but, if the Celta is not incorporated in the dyed state, and the goods are to be dyed as a whole, the difficulties are very great.

In goods of a mixed nature, in which the acetate-rayon component is used for effects, its tinctorial peculiarities are in its favor, effect-dyeings being very easy to attain. But dyestuffs which will dye both wool and acetate-rayon are not available at present; we are obliged to employ combinations of the two types of dyestuff, one of which will dye the wool, the other the acetate component.

Dyestuffs of the Celliton and Celliton Fast types are the only kinds which give good tone-matches between the different types of fiber. The Cellitazols are also useful for some dark tones, especially for blacks and dark blues. If the latter class of dyestuffs is employed, it is necessary to employ the two-bath procedure, pre-dyeing the acetate-rayon with the proper Cellitazol, and top-dyeing the wool component with acid colors. For the acid colors, the Metachrome colors may be used; the dyestuffs which require afterchroming are not so satisfactory. It must be kept in mind that the fastness to top-dyeing of the Cellitazols is decidedly limited, so that only such colors may be chosen as are satisfactory in this respect.

A two-bath procedure is not liked. A rather recent method avoids this annoyance, and gives good results. Celliton or Celliton Fast colors are used in a single-bath procedure with weakly acid dyestuffs, either in acid or neutral bath. The acid bath gives a product which has a better feel. It is made up with about 5 per cent of acetic acid, the goods are entered at a moderate temperature, brought slowly to the boil, and kept there for about 15 minutes. This method gives a dyeing of better fastness properties. If the neutral bath is preferred, it is recommended to add a little Igepon or Gardinol or some such assistant, as well as Glauber's salt. In this method, a short boil is also advisable.

In either case, on account of the rather unsatisfactory fastness to rubbing of such dyeings (referring to the Cellitone and Cellitone Fast colors), a final treatment in a bath containing one of the modern detergents (Igepon, Gardinol, etc.) is advisable.

Some trouble is encountered through the Celliton and Celliton Fast dyestuffs bleeding into the wool. Not all of these colors are very likely to do so, but some which often must be used, such as the bright reds and scarlets, do so badly. In such a case, the dyer must reconcile himself to the bleeding taking place, and minimize it as far as he can.

When the wool dyestuffs which are used are specifically fast to light, this property, taken with the less high fastness to light of the above acetate colors, means a progressive change for the worse in the light-fastness of the dyeing taken as a whole, the more Celta fiber is present. If possible, therefore, to avoid this result, the wool dyestuffs should be chosen as of about the same light-fastness as the acetate colors to be used.

The whole problem of dyeing such mixed goods really satisfactorily is at present rather in doubtful shape.

Peroxide Bleaching and Its Use with Cotton and Union Goods

Dr. Herman Baier—Monats. f. Textil-Ind. 52, 212 (1937).—An abstract of a paper presented before the general meeting of the V.D.F. and I.V.C.C. in Frankfurt, July, 1937.

In spite of the brief nature of the abstract as published, three tables are given, in reference to losses encountered in carrying out the different methods of working which are customary. According to the author, waterglass, in combination with hard water, is the best agent to employ, and is also an excellent stabilizer in the absolute sense.

Peroxide in distilled water is exhausted in two hours, in distilled water containing waterglass in one-half hour, in hard water in five hours; and in hard water containing waterglass only 30 per cent of the peroxide is destroyed after five hours.

As to losses in union goods containing rayon in various bleaching processes, the author gives the following interesting figures:

Kiering, chloring, peroxide..	about 12%	loss
Macerating, chloring, peroxide	about 7%	loss
Peroxide, chloring, peroxide..	about 5%	loss
Peroxide twice in succession..	about 3.5%	loss
Single peroxide bleach.....	about 2.5%	loss
Chloring, peroxide	about 2.5%	loss

The loss in weight was determined from the loss in the rayon component, since breaking-strength, stretch, and viscosity measurements showed little or no change sufficient for critical purposes.

The third table gives some results, along the same line, obtained from five different plants, as follows:

	Loss
Plant I—Old method. Kiering, chloring, peroxide	8.5%
New method. Peroxide, chloring, peroxide.	2.8%
Plant II—Old method. Kiering, chloring.....	10.05%
New method. Maceration, peroxide.....	4.75%
Plant III—Rayon 50-100%. One bath, peroxide.	1.14%
Plant IV—Old method. Kiering, chloring.....	8.56%
New method. One bath, peroxide.....	1.66%
Plant V—Old method. Chloring at boil.....	8.56%
New method. Chloring-peroxide	1.94%

It seems to be the strong alkali of the kiering which causes the principal loss. With unions containing relatively little rayon, the material dissolved from the cotton seems to act as a protective colloid, and the loss on the rayon is less; but with much rayon present the relations are of course altered, and should be carefully considered.

Fast Dyeings on Rayon

H. Brandenburger—Mell. Textil-Ber. 18, 649 (1937).—A generally informative paper of practical nature.

Dyeing of Unions of Wool-Rayon

Dr. Th. Egger—Mell. Textil-Ber. 18, 651 (1937).—A short, practical, good paper.

TRADE NOTES • NEW PRODUCTS

• "STORIES OF AMERICAN INDUSTRY"

A growing public interest in the problems and accomplishments of our great American industries is being shown today which indicates progress toward the solution of many of our problems, Secretary Roper stated in a foreword to the second series of the Department of Commerce's publication, "Stories of American Industry," released from the press of the Government Printing Office recently.

The book is a compilation of 32 radio programs, each of which gave the story of one great American industry. Harry R. Daniel was the editor of the script and narrator on the air, the program being given over the Columbia network.

In his foreword Secretary Roper said: "The interest shown in our radio series by persons in all walks of life is to my mind proof that the people of this Nation are anxious to obtain a comprehensive understanding of the history, the accomplishments, the manifold problems, and the fine public service of our great industries.

"It is particularly gratifying that hundreds of colleges and schools in America are finding that these talks may be used to advantage in classroom studies.

"I believe that this wholesome public interest in all phases of industry indicates progress toward the solution of many of our problems.

"Because of its usefulness in carrying to millions of our people reliable and important information regarding our industries, I feel that this radio program constitutes not only one of the rightful activities of the Department of Commerce, but one of its most useful."

The book contains the stories of the following industries:— machine tools, radio manufacturing, structural clay products, naval stores, asphalt, man's fight against insects, musical instruments, furniture, motor vehicles, glass, carpets and rugs, petroleum, dairy products, commodity distribution, chemicals in industry, tobacco, toys, motion pictures, boots and shoes, canning, coffee and tea, printing, gas, home building, grain milling, perfumes and cosmetics, scientific instruments, new industrial products, electric power, sailing yachts and motorboats, progress of aviation, and shipping.

The first volume of the series which appeared last year contained the stories of 23 American industries and was credited by Government officials as being one of the best sellers ever issued by the Superintendent of Documents.

• ELECTED A-H PRESIDENT

At a meeting on August 1, 1938, the Directors of Arnold, Hoffman & Co., Inc., at their office in Providence, elected Thomas H. Roberts as Vice-President and Technical Director of the company.

Mr. Roberts is a graduate of Brown University in the Class of 1913, where he also received the degree of Master of Science in 1914.

In 1915 he organized one of the first dyestuff and intermediate factories to begin operation after the start of the World War and has been actively engaged in dyestuff and chemical manufacture since that time.

Mr. Roberts became associated with Arnold, Hoffman & Co., Inc., in January, 1926, as manager of their dye plant. His broad experience in the dyestuff and textile industry has made him well qualified to assume his new duties.

• ARTHURS CHEMICALS

Announcement has been made by F. J. Arthurs of the fact that, effective September 1st, he took over the Industrial Chemicals Division of the Larkin Co., Inc., and henceforth will conduct this as his own business. All of the manufacturers previously represented by Larkin will now be represented by Mr. Arthurs and some additional lines have also been added. Offices and stocks will be at the Larkin plant in Buffalo, located at 680 Seneca Street, Buffalo, N. Y.

• CIBA REVIEW

Ciba Review, Number 12, has recently been distributed to the trade. Featured in this issue is the subject of weaving and dyeing in ancient Egypt and Babylon. Articles which appear are described by the following titles: "Ancient Babylon and Egypt"; "Ancient Egypt, the Land of Linen"; "Babylon-Assur, the Land of Wool"; "Colors of the Ancient Orient"; "Historical Gleanings"; "Scientific Notes." This issue completes Volume I of the publication.

Also included with this issue is a supplement entitled "Ciba and Cibanone Colors for Piece Bleached Colored Woven Goods." Copies of the *Ciba Review* are available upon application to the Ciba Company, Inc., P. O. Box 25, Station C., New York, N. Y.

• COURSE IN DYEING

Robert Zametkin, chemist and dyer for the Congress Piece Dye Works, Paterson, N. J., and formerly chemist and dyer for Pilgrim Piece Dye Works, Brooklyn, N. Y., will conduct a course in experimental dyeing at the new Evening Textile High and Trade School, 351 West 18th Street, New York City.

The course will be given from 6:50 to 8:50 P. M. on Tuesdays and Thursdays. Registration is from 6 to 10 P. M. until September 26. Tuition is free.

• APPOINTED WARWICK DISTRIBUTOR

Alex C. Fergusson, Drexel Bldg., Philadelphia, Pa., one of the oldest distributors of heavy chemicals in the United States has been appointed sales representatives of Warwick Chemical Company. Their territory will include all of Pennsylvania, Maryland, Delaware and part of New Jersey and West Virginia.

Walter Lane, who has been located at the office of Warwick Chemical Co. in West Warwick, R. I., is going to Philadelphia to work with the Fergusson organization as factory representative.

Hereafter, Warwick Chemical Company will carry a stock of chemicals in Philadelphia in addition to the stocks which they already carry in their Allentown and Wilkes-Barre storehouses.

• JOINS DIAMOND ALKALI

Effective September 1st, C. V. Douglas, president of the George Chemical Co., Inc., New York City, accepted a position as Metropolitan New York representative of the Diamond Alkali Co., with headquarters in New York City, succeeding J. Cline McKenna, who has made his headquarters in Pittsburgh, Pa., as assistant manager of alkali sales for the Diamond Alkali Co.

• TO HOME OFFICE

Harold W. Rose has returned to the home office of Warwick Chemical Company at West Warwick, R. I., where he will resume charge of sales in addition to his duties as vice-president of Impregnole Corp.

For the past year and a half, Mr. Rose has been located at 580 Fifth Ave., New York, which is the office of the Impregnole Corp., a subsidiary of Warwick Chemical Company.

● ELECTED GEORGE CHEMICAL PRESIDENT

H. P. Smith, vice-president and treasurer of the George Chemical Co., Inc., has been elected president of the company, succeeding C. V. Douglas who has gone with the Diamond Alkali Co. Mr. Smith will be in charge of sales of the George Chemical Co.

● METHACRYLATE ESTERS

Entry of the methacrylate esters into a wide variety of uses has been described by three du Pont Company chemists who have played an important part in the development, D. E. Strain, R. Grice Kennelly and H. R. Dittmar.

The several esters, all of them water-clear thermoplastic resins, were noted as having found commercial application as impregnants for wood, cloth, paper, electrical apparatus, metals and stone. Materials treated in this way are said to be more resistant to water, oils and chemicals. Wood, for example, is said to be stronger and more resistant to water absorption, warpage and the action of chemicals when thus impregnated.

"Polymeric methyl, ethyl, propyl, butyl and isobutyl esters of methacrylic acid have now reached a point of established commercial value," the authors stated. "Polymeric methyl methacrylate, the base of 'Lucite' plastic, is a hard, rigid resin of high tensible strength which softens above the boiling point of water. As the molecular weight of the alcohol increases, the polymers become softer and more plastic. Film-forming and adhesive properties, as well as solubility and compatibility, also change markedly along the series.

"They transmit a high proportion of visible light and are superior to glass in the transmission of ultra-violet light. They are color stable on exposure to light and have excellent ageing properties, and are not discolored by heating and are extremely stable to decomposition by heat."

The methacrylate resins possess excellent film-forming and adhesive properties and because of their wide compatibility with solvents, plasticizers and resinous materials readily enter into more complex formulations, it was said.

It is stated that emulsions of wax-methacrylate compositions can be prepared readily, enabling coating to be carried out by spraying, brushing or dipping at normal temperatures. Films flowed from emulsions are said to be characterized by the same toughness and flexibility as films deposited from melt.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Finishing plant chemist desires responsible position. Expert on vats, napthols and other cotton and rayon dyeing. All types of control work and testing. 26 years' experience on yarn and piece goods. Write Box No. 993, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

CAPABLE CHEMIST WANTED: Young, aggressive, growing concern located in East has unusual opening for wide awake, well trained, accurate chemist between ages 25 and 35. Must have had industrial experience in both routine and development work in textile or allied fields. Opening is with company in specialty detergent field with unusual opportunity for a man who can qualify. State all qualifications, degrees, experience, enclose photograph and address application in own handwriting to Box No. 145, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Plant-chemist, technician desires position with dyeing or printing organization. Can take charge or supervise the processing of rayon, acetate, spun rayon and cotton fabrics, also lastex corsets and swim suitings. Can supervise laboratory control and research, economy in dyeing and finishing. 14 years of practical experience with leading organizations. Write Box No. 146, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Seek position as dyeing and finishing executive in Canadian mill. Viscose, rayon, acetate, cotton, etc. Color matching, laboratory experience. Write Box No. 147, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED: Position as Assistant Textile Technician open on the Research and Development staff of a large synthetic yarn manufacturer. Young man with textile school training preferred especially with subsequent experience. Write Box No. 148, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED: Textile Chemist: Wanted for technical sales work in Southern territory. Must be Textile School graduate and have five to ten years' experience in printing and finishing plants. Warp sizing experience also desirable. Write fully, stating age, training, experience, previous employers with salary received. Box No. 149, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED: Textile Chemist: With one or two years' experience in printing and finishing plant. Must be recent Textile School graduate. Write in detail, giving age, college training, and plant experience. Box No. 150, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: By piece goods dyer experienced on cotton, rayon, silk and acetate. Straight, union or cross-dye. Age 39, chemist. Eight years laboratory—14 years boss dyer. Familiar with all types of dyes and equipment. Last position four years with large manufacturer. Best references. Write Box No. 151, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.